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PATENTS FOR INVENTIONS.

ABRIDGMENTS

OF

Specifications

RELATING TO

ACIDS, ALKALIES, OXIDES, AND SALTS.

A.D. 1622–1866.

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PREFACE.

THE Indexes to Patents are now so numerous and costly as to render their purchase inconvenient to a large number of inventors and others, to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of Invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Alphabetical, Subject-matter, and Reference Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the printed copies of the latter are sold have been added.

The number of Specifications from the earliest period to the end of the year 1866 amounts to 59,222. A large proportion of the Specifications enrolled under the old law, previous to 1852, embrace several distinct Inventions, and many of those filed under the new law of 1852 indicate various applications of the single Invention to which the Patent is limited. Considering, therefore, the large number of Inventions and applications of Inventions to be separately dealt with, it cannot be doubted that several properly belonging to the group which forms the subject of this volume have been overlooked. In the progress of the whole work such omissions will, from time to time, become apparent, and be supplied in second or supplemental editions.

The following series, besides embracing all Inventions relating to the making or obtaining by any direct or indirect methods of acids, alkalies, oxides, or salts, includes Inventions relating to the making or obtaining of several elementary bodies, among which are, bromine, carbon, chlorine, fluorine, iodine, hydrogen, nitrogen, oxygen, and sulphur, and some compound substances or bodies, such as cyanogen, none of which of themselves possess either the property of an acid, an alkali, an oxide, or a salt, but which in the process of their production are accompanied very frequently by the formation of one, two, three, and even in many instances of all of these substances in one and the same Invention. Under these circumstances it was considered advisable that any Inventions which might relate simply to the production of bromine, carbon, chlorine, fluorine, iodine, hydrogen, nitrogen, oxygen, sulphur, or cyanogen, should find a place in this series.

The Abridgments marked thus (* *) in the following pages were prepared for another series or class, and have been transferred therefrom to this volume.

B. WOODCROFT.

June, 1869.

INDEX OF NAMES.

[The names printed in *Italic* are those of the persons by whom the inventions have been communicated to the Patentees.]

Page
Abel, C. D. 757, 780
Albright, A. 307
Allen, J. 452, 575
——, W. 452, 575
Amos, C. E. 976
Anderson, W. 976
Angell, L. 91
Archereau, H. A. 886
Ard, C. 18
Armbruster, C. 445
Armstrong, H. 844
Arrott, A. R. 211, 260, 629, 644, 681
Ashworth, J. 61
Aspdin, W. 351
Astley, J. 70
Atkinson, E. S. 455, 510
——, J. 47
Attwood, C. 90, 109, 111
Aubertin, E. 760, 901
Augier, J. V. 342
Aymard, W. A. P. 366
Azulay, B. 263

Baggs, I. 191, 502, 785, 838, 902, 1018
Bagnères, R. S. 892
Bailey, A. M. 23
Baker, C. S. 958
——, D. 525
——, J. 17, 19
Baker, H. M. 998
Baker, W. 673
Bakewell, F. C. 547, 638
Balmain, W. H. 275, 446, 483, 760, 764
Bang, A. 909

Page
Bankart, A. 953
——, F. 227
Barcroft, B. 532
Barham, A. G. 568
Barker, J. 17
Barlow, C. 281, 350
——, T. G. 304
Barnes, G. P. 873
——, J. 225
——, R. 264
Barratt, O. W. 149, 215
Barrow, J. 759
——, J., junior 473, 477
Barruel, G. 489
——, J. J. E. 236
Barry, A. 6
Barry, P. G. 479, 591
Barsham, J. 113, 374
Basset, N. 918, 946
Bath, E. 816
Baudesson, A. 907
Bazille, T. G. 168
Beatson, W. 473
Bekart, F. B. 327
Bell, I. L. ...303, 345, 388, 649
——, J. 34
——, T. 130, 231, 239, 319, 322, 426, 551, 947, 959
——, T. L. G. 947
Bell, W. 994, 1014
Bellemois, M. H. 147
Bellford, A. E. L. 336, 357, 395, 441, 443, 456
Benecke, W. 83
Bennett, F. 841
——, S. 930
——, T. 7

Page
Benson. E. W. 116, 137
Béranger, A. 995
Bernhard, I. 943
Berry, M. 118, 166
Bessemer, H....................553
Bethell, J. 578, 592
Bigg, J. 43
Binks, C. 149, 230, 376, 517, 518, 672, 683, 717, 786, 820, 910
Birkmyre, W. 212, 258
Birnie, S.........................35
Bischof, G., junior 773
Blackmore, W. 788
Blair, H......... ..170, 564, 655
Blaze, A. 168
Blügel, A.......................1011
Blythe, W... ......280, 429, 442
Bobœuf, P. A. F. 541, 756
Boggio, G. G. ... .899
Bohringer, C...................370
Bonneville, H. A. ...995, 1016
Bonney, W. W...............535
Booker, N. 74
Booth, J. C. 343
Bossi, S. 543
Brock, J. A. 439, 562
Boulton, S...............317, 567
Bousfield, G. T. 832, 1005
Bowditch, W. R. 400, 922
Bower, G. 677
——, J..........................169
Bowman, K....................17
Bowron, J...............859, 865
Boyd, W. 377
Brackenbury, A. 341, 371
Braithwaite, J. 103
Bramwell, T...................421
Brierly, J........................72
Britten, J. 235
Brooman, C. E. 994, 1019
————, R. A. 404, 479, 528, 557, 591, 643, 703, 760, 765, 776, 789, 796, 828, 835, 862, 898, 901, 907, 925, 951, 960, 964
Browell, E. J. J..............531
Brown, D. S....................332

Page
Brown, G. 217
———, P. 583
———, W. A 106
Browne, H. 55
Brunlen, L. 641, 663, 725
Brunel, B. F....................482
Bryant, J. D...................637
Bucholz, L. 698
Bührer, J. 988
Bullock, J. L..................237
Buran, G. L. E. 386
Burnet, J. G. L. 835
Burnett, J.......................542
Burq, V..........................914
Bursill, G. H. 359
Burton, C. L. P..............783
Burton, G. W. 563
Bury, A.........................144
Bush, W. 638, 661
Button, C.......................132

Cademan, T. 3
Calvert, F. C. 693
Caminade, J. P. 978
Campbell, G......................8
————, H. 42
Carpenter, E. 1024
Carr, T. 647
Carré, F. P. E. 699
Carter, G. 377
Cartwright, M. 356
Castets, A. 425
Casthelaz, J. 915, 918, 934, 946
Catherwood, W. 17
Chadwick, H. 868
Challeton, J. F. F...........392
Chamberlain, H. 895
Champion, W...................10
Charlton, J. 919
————, H..................919
Chaudet, J. H. 939
Chenaillier, P. 782
Chénot, A......................246
Chenot, C. B. A. 405
Chetwynd, G..................965
Chisholm, G. 703
————, J. 147, 157, 396, 703
————, W. 337, 375

Page
Christian, J. O. 919
Church, A. H. 770
———, W. 103
Clapham, R. C. 447, 695, 839, 844
Clark, M. 823
——, T. 109, 132
——, W. 359, 507, 574, 593, 597, 602, 626, 667, 670, 726, 735, 779, 811, 831, 841, 854, 872, 886, 891, 908, 914, 928, 950, 952, 955, 1000
Clarke, R. 1
Claudet, F. 1009
Claus, C. F. 520, 919, 935
Claussen, P. 316
Clay, W. N. 123
Clayfield, W. H. 66
Clayton, T......................817
Cleland, W. 768
Clemm, D. C. G. 845
———, G. 370
Clench, J. 868
Cliff, J. 222
Clift, S. 303, 544
Clough, W. T. 141, 182
Cobley, T. 704, 710, 718, 726, 744, 745, 746
Cochrane, C. 790
Coffey, T. A. 805
Coignet, Père et Fils, et Compaignie Société 776
Colby, T. 483
Collier, W......................416
Collins, J. 398, 533
———, R. N. 270
Collison, J. 31
Collyer, R. H. 958
Condy, H. B. 345, 401, 414, 496, 1021
Constable, J. 222
Conway, H. S. 31
Cook, T. A. 505
Cooke, W. 305
Cookson, W. I....167, 207, 408
Cooper, S. 613
Copley, J. 2
Corbett, J. 670

Page
Corbelli, L. F. 568
Cordurié, F. 1019
Cormack, W.......219, 284, 381
Cory, H...........................144
Cossins, G. H. 748
Coste, J. M. G. 412
Cotelle, E. A....................877
Cotelle, E. A. 908, 1000
Cottrill, T.......................355
Coulson, S. 454
Court, W...........................93
Courtois, A. 723
Courtoise, M. F. A. 755
Cowen, J. 344
Cowper, C. 280, 361, 407
Craanen............................62
Cragg, E. 76
——, W.............................76
Craig, J. 96
Crampton, T. R. 900
Crane, C. 260
Craven, J. 895
Creed, Sir J. 16
Crockett, J. L. 497
Crockford, C. 580, 605, 849, 1013
Croll, A. 139
Croll, A. A. 159, 172, 224, 265, 539, 577, 677, 739, 791, 903, 927
Cronier, P. N. 160
Crooks, J. 50, 55
Croote, F. 2
Cropper, E. 20
Cross, R. 64
Crowther, W....................604
Crump, C. 966
Cuisinier, J. F. J........765, 796
Culpepper, Sir T. 3
Cuninghame, A. 386, 393, 446

Dahll, T. 665
Dale, J. 465, 510, 515, 594, 609, 769
——, J. G......................825
Dales, J..........................640
Danjou, L. 951
Darbel, A. R. F. N.........1007

Page
Darlington, G. ...474, 817, 873
Dason, J. 6
Dauglish, J. 603
Dauriac, M. 489
Davey, W. 931
Davidson, J. 171
————, J. C. 297
Davies, G.... 699, 876, 979, 997
Davis, H. F. 973
——, J. 1002
Dawson, J. 656
Deacon, H. 394, 464, 555, 558, 568, 581, 659, 780
Deane, W. F. 974
De Berenger, C. R. 78
————————, P. A. 1002
De Bergevin, A. M. M. ...386
De Boneuil, A. B. 36
De Briges, A. 496
De Bruges, P. T. 22
De Bussac, D. 460
————, J. F. D. 380
De Douhet, G. F. 291
De Fonbonne, C, A. 479
De la Perouse, L. 784
De la Provotais, E. G. F. ...747
De la Rue, W. 462
De Massy, L. P. R. 878
De Massy, L. R. 878
De Mayerne, Sir T. 3
De Meckenheim, L. N. ...381
De Melcy, A. C. A. G. 735
De Rostaing, A. A. A. 574
De Secqueville, C. 937, 965
De Siebenthal, B. 613
De Sinçay, A. C. St. P. ...957
De Soulange, J. E. 723
De Sourdeval, A. L. 626, 667, 670, 726, 735, 779
De Suarce, C. G. B. 152
De Sussex, F. S. M. 211, 238, 249, 252
De Tregomain, F. M. A. ...872
De Wissocq, P. E. 1016
De Wyldé, F. 856
Dédé, S. 762
Deely, W. C. 516
Dehaut, F. 952

Page
Delafield, C. 969
Delahante, A. 80
Delaune, A. 776
Delaval, T. 20
Deltour, W. 935
Demangeot & Co. 643
Denoon, A. 205, 206
Dentith, J. M. 932
Dering, G. E. 364
Desaguliers, J. T. 8
Desprez, J. A. 109
Dick, A. 596
Dickson, J. 793, 798, 801
Dixon, W. A. 860
Donkin, J. 242
Doughty, C. 879
Down, J. 700, 730
Drevet, C. A. 722
Drew, T. 218
Drouet, N. A. 562
Du Buisson, M. A. B. B. ...223
Du Fresne, F. F. 5
Du Motay, C. M. T. 898, 964, 994
Dubus, R. I. C. 552
Duclos de Boussois, E. J. F. 157, 189, 200
Duesbury, W. 96
Duff, C. 586
Dufrené, H. A 937, 938
Duméry, C. J. 712
Duncan, J. 656, 774
Dundonald, A., Earl of, 28, 42, 44, 50, 52, 78
Dunlop, C. T. ...251, 453, 471
Dunn, J. L. 435
Dureau, J. B. 703
Dusart, L. 854
Duyck, J. E. 179
Dyar, H. G. 132, 138, 157
Dyer, C. B. 182
——, J. 356

Eades, C. 981
Ecarnot, J. B 282
Eden, F. M. 731
Edwards, H. H. 398
————, R. 81

Page
Eland, C. 1
Ellins, G. 217, 244, 262
Elliott, G. 302, 349, 368, 415, 484, 503
Ellis, H. 812, 945
——, J. 455, 490, 535
Ellison, P. 490
Elmer, W. 832
Emerson, F. W. 362, 463, 606, 624
Emery, A. H. 944
Ensell, H. C. 963
Ericsson, J. 103
Eschwege, H. 792
Esquiron, X. T. 579
Evans, F. J. 286, 312, 313, 587
——, J. 5
——, L. W. 433

Falk, H. E. 402
Farmer, T. 168
Faure, L. 405
Favre, P. A. 454
Fell, A. G. 994, 1014
Fell, A. M. 798
Fell, T. M. 994, 1014
Fell, R. 308
Felsch, H. 830
Férand, V. M. 642
Firmin, G. J. 307, 486, 648, 813
Firmstone, T. 163
Fishwick, R. 35
Fletcher, J. 682
Floret, J. P. M. 348
Flude, C. 136, 159
Fontainemoreau, P. A. 292, 334, 432, 437, 502, 509, 932
Forbes, J. 894
Ford, E. 153
Fordyce, A. 24, 30
Forster, T. 278
Fourmentin, J. M. 253
Fowler, J. 143
Fox, S. 822
France, G. T. 1010

Page
Francke, T. 3
Frankland, E. 447
Fraser, J. 552, 573
Frearson, D. 40
Fredet, A. A. 914, 928, 950
Fuller, H. P. 89
Furnival, J. B. 179, 187
——, W. 95, 96, 105

Gagnage, C. M. 955
Galy-Cazalet, A. 543
Gamble, J. C. 96, 154, 214
Gamboni, P. 415
Gardner, J. 459
Garnett, J. 188
Garrod, W. 111
Garton, C. 607, 808, 830
Gatty, F. A. 293, 545
Gauthier, L. J. 494
Gautier, A. J. A. 347
Gedge, J. 477, 489
Gégnon, P. E. 955
Gélis, A. 690
Gélis, A. 854
Gerard, J. 31
Gerbaut, H. 475
Gerhardt, W. 920
Gerland, B. W. 511, 536, 765, 788, 849
Gerstenhöfer, M. 855
Geslin, L. P. 391
Geyelin, G. K. 370
Gibbins, B. 91
Gibbs, H. H. 415
Gibson, J. B. 198
Gilbee, W. A. 516, 584
Gillard, J. P. 747, 940
Gillow, J., junior 396
Gisborne, T. M. 884
Gjers, J. 871
Glass, W. 469, 777, 812
Glassford, C. F. O. 926
Glenny, G. 38
Glover, R. M. 379
Goodlet, G. 127
Gore, S. 304

Page
Gossage, W.......116, 117, 125, 129, 130, 136, 232, 344, 374, 379, 390, 406, 412, 461, 484, 499, 504, 506, 513, 519, 521, 526, 546, 550, 591, 595, 608, 610, 612, 622, 623, 646, 775, 795
———, W. H. 293, 301
Grace, T. 57
Graham, J...201, 318, 644, 920
Grantham, J.............754, 851
Gray, T. 1018
Green, C. 645, 698
——, J............................7
Greenall, J. 18
Greenshields, T...210, 351, 569, 572, 631
Greenway, C...................675
Greenwell, G. C. 560
Greenwood, J. 225
Gregson, J. B. 177, 215
Grellier, J.........................73
Grisenthwaite, W............101
Groves, P. 98
Gurlt, A..........................943
Gwynne, J......................395
———, J. E. A. 395
Gwynne, W. H. 864

Haddock, U......................89
Haeck, F.........................879
Haeffely, E. 409, 584, 748
Hagner, G. F. 89
Hähner, G.......................480
Hahner, W. 411
Hall, D. 898, 959
——, J. 122, 141
Hallett, G. 720, 722
Halliday. A. P. 267
Hallsworth, S. 852
Ham, J. 94, 97
Hamel, C. 988
Hanworth, C......................3
Hardinge, H....................397
Harewell, Sir E. 1
Harris, T..........................11
Hartley, F. W. 822

Page
Harvey, J. 172
Hasenclever, D. 605
Hately, J..........................46
Heard, E. 140
Heathorn, C. 95
Hebert, J. H....................1016
Hemming, J.............123, 138
Henderson, W. 354, 382, 430, 548, 614, 651, 668, 700, 824, 929
Hendriks, H.............106, 109
Henry, M. 548, 586, 679, 776, 781, 801, 861, 963
———, W. 87
Herapath, W. B. 393, 804
Herbert, J. A. 641, 663
Herring, E. 384
Heusner, K. L. 843
Hervey, R. 162
Heys, J. 22, 32
Higgin, J. 372, 413, 463
Higgins, B. 29
Hills, E...................556, 561
——, F. 183, 227, 240
——, F. C. 268, 1022 (*Appendix*), 314, 539, 650, 881, 998
——, G. 183
——, T. 89
Hinton, W. 9
Hoakesly, R. 48
Hobart, A. 2
Hodson, G....... 42, 48, 60, 76
Hoffmann, F. 654, 895
Hofmann, P. W. 978
Hofmann, P. W. 1005
Holdrege, H. 864
Holland, H. 452
Holme, P..........................20
Holroyd, S. 820
Hompesch, T. A. W. C. de 185
Horsford, E. N................417
Horsford, E. N..........485, 501
Horsley, J......................444
Horton, T...............448, 922
Houbigant, A...................679
Houzeau, P.......................907
Howard, T. 57

Page
Hughes, E. T. ... 1001
———, F. R. ... 761
———, H. ... 4
———, J. ... 448
Huillard, A. ... 543
Humby, J. ... 830
Hunstmann, R. ... 995
Hunt, J. ... 156, 236
———, W. 164, 264, 327, 385, 406, 424, 436, 444, 669, 705, 808
Hunter, A. G. 656, 702, 909, 927
———, A. G., the younger 676
Hutchins, S. ... 10
Hutchinson, S. ... 5
———, W. H. ... 781, 804
Hurwitz, G. ... 822

Imeary, R. ... 576
Imhof, D. ... 547
Ireland, T. ... 529
Irvine, R. ... 750, 843

Jacob, C. ... 389
Jäger, H. ... 332
Janssens, V. J. ... 801
Javal, M. P. ... 960
Jay, C. ... 254
Jee, H. ... 941
Jefferies, W ... 156
Jenkin, A. ... 573
Jennings, H. C. ... 274, 560
Jensen, A. N. ... 666
Jewers, D. ... 16
Johnson, J. ... 904
———, J. H., 336, 423, 434, 450, 494, 618, 628, 687, 688, 762, 783, 876, 892, 1008
———, J. R. ... 233
———, T. ... 522
———, W. 75, 83, 93, 98, 470, 826
Jones, B. ... 864, 878, 884
———, E. T. ... 232, 725
———, R. ... 1
Jons, J. ... 190, 502
Joseph, J. S. ... 772

Page
Jossa, F. ... 657
Jouannet, M. V. ... 778
Jullion, J. L. ... 724, 800
———, J. T. ... 243, 260
Jump, W. A. ... 93, 106, 497

Kagenbusch, P. ... 194
Karcher, E. ... 898
Kay, J. ... 13
Kean, J. ... 760
Keates, T. W. ... 681
Keeling, J. ... 47
Keir, J. ... 67
Kent, R. T. ... 703
Kenyon, H. ... 541
Kernot, C. N. ... 731, 756
Kestner, C. ... 925
Keys, J. ... 141
King, J. ... 27
Kirkham, J. ... 324
———, T. N. ... 324
Kite, J. Secundus ... 489
Knab, D. C. ... 357
Kneller, W. G. ... 81, 196
Knowles, Sir F. C. ... 537
Kopp, E. ... 429, 442
Krasinski, L. ... 1016
Kuczynski, J. ... 418
Kulmann, F. ... 441, 456
Kunheim, H. ... 940
Kurtz, A. ... 235
Kyan, J. H. ... 132

Lagrange, J. V. P. ... 943
Laing, R. ... 727, 733, 748
Laist, O. ... 445
Lake, W. R. ... 994, 1014
Lamb, J. ... 327
———, H. ... 788
Laming, J. ... 231
Laming, J. M. ... 738
Laming, R., 181, 201, 256, 263, 266, 286, 325, 347, 389, 427, 438, 442, 475, 523, 600, 634, 645, 684, 738, 863
Lamotte, X. ... 781
Lang, T. H. ... 660
Lange, T. ... 725

Page
Large, C. 1001
Lark, J. 515
Lauder, G. 529
Laureau, L. 407, 642
Laurens, C. P. P. 655
Laurent, A.......................963
Laurent, F. A. ...915, 918, 934
Larigne, L. E. 811
Law, E. 154
——, J. 996
Leake, J. S. 309
Leather, J. K. 899, 904, 912, 1012
Le Chatelier, L. 706
————, *M.* 566, 588, 619
Le Coq, P. P. 562
Le Grand, J. 92
Ledsam, J. F. 99
Lee, J. 185, 208
——, T. V. 875
Leese, J., junior................440
Lefebvre, M. 622
Leidemann, A. 725
Leigh, J. 152, 825
Leighton, T. H. 116
Leisler, L. 605, 910
Lejeune, J. 187
Lepainteur, E. 823
Leplay, A. H. 765, 796
———, *H.* 611
Lequin, C. L. E. 862
Lesieur, E. A. 891
Leslie, J. 686
Leverson, M. R...........754, 913
Lewis, G. 821
Leyland, E. 388, 394
Licht, A..........................654
Lichtenstadt, D. 586
Lidbetter, T. 219
Liebhaber, J. C. B. 300
Lightfoot, J. 873
————, T. 873
Linden, D. W.....................14
Linning, M. 129
Lister, R. 400
Livesey, G. T. 787, 936
Lockey, J. T......................942
Lodge, E. 455

Page
Lodge, W. 16
Lombard, J. B. A. 579
London, P., the elder 74
————, P., the younger ...74
Longmaid, J...............372, 671
————, W. 194, 206, 226, 246, 256, 269, 306, 372
Lorberg, W. 658, 728, 833, 852, 856, 859
Losh, W. 133, 712
——, W. S. 321, 324
Lothman, C. R. 247
Loughton, J......................219
Lowe, G. ... 107, 238, 312, 313
Lozano, M. P. 468
Lucas, J. L. 496
Lucas, J. V. 618
Lucas, S. 14
Luis, J. 592
Lunge, G. 981
Lürig, G. 482
Lutwyche, T.....................123
Lycett, W. 969
Lydall, R. 7
Lyte, F. M. 383

Maas, J. A. 77
Macaire, L. C. 689
Macallum, J......................505
Macfarlane, T. 826
Mackay, J. 18, 20
MacLeod, J. 102
Macqueen, J. 672
McArdle, J. S. 740
McBryde, J. 433
McCall, R. 636
McClintock, E. 758
McCrummen, D. 585, 938
McDougall, A.... 269, 378, 402
Maillard, N. D. P...............753
Malcolm, J. D. 732
Mallet, J. T. A. 956, 1015
Maltby, W. 538
Manbré, A. 570, 578, 627, 639
Manley, J. 59
Manning, J. A. ...458, 675, 734
Mantell, J. 23
Mautraud, E. C. 419

Page
Marbury, W. 6
Marçais, J. J. 989
Maréchal, C. R. 964
———, *C. R., junior* 994
Margesson, P. D. 588
Margueritte, F. 437
Margueritte, L. J. F. 434, 435, 471, 511
Margueritte, L. J. F. 667, 670, 726, 735, 779, 841
Margulies, B. 899
Margulies, B. 904, 912
Marriott, E. 820
———, G. 377
Marshall, G. 455
———, J. 66
Martien, J. G. 460
Martin, A. 995
———, *E. C.* 593, 597, 602
Martin, J. C. 750, 977
Masters, T. 278
Matussière, P. A. H. 914
Maugham, W. 114, 127, 130, 488
Maumené, E. J 633
Mayer, F. F. 659
Mayo, E. 5
Mease, G. D. 719
Medlock, H. 637
Meldrum, E. 466
Mellor, J. 749
Menday, J. 327
Menish, W. 41
Mennons, M. A. F. 613, 778
Mercer, J. 225, 236, 280
Mesdach, L. 528
Metcalf, J. 513
Meyer, A. 920
———, M. 920
Michiels, G. 289, 350
Midgley, G. D. 132
Millan del Real, D. F. M. 882
Miller, T. 9
Mingaud, P. 732, 935
Mitchell, J. 27
———, J. B. 261
Moinier, J. B. 404
Moll, I. 476

Page
Monckton, E. H. C. 753, 771
Mond, L. 803
Mond, L. 811, 853
Monod, F. D. 501
Montebruno, E. 110
Moore, T. 6
Morel, A. 834
Morfitt, J. 101
Moride, E. 906
Morin, P. 488, 749
Morris, T. 753
Mott, A. J. 952
Moule, J. 680
Moutié, J. J. 897
Mucklow, E. 352
Muller, A. 762
Müller, J. J. 829
Mullins, J. 195
Murdoch, J. 279, 346, 361
Murdock, W. 37
Murford, N. 3
Muspratt, E. K. 511, 536. 977
Muston, P. I. 110

Napier, J. 214, 221, 890
———, J. M. 444
Nation, W. B. 356, 630
Naylor, J. 66
Neale, J. W. 179
———, T. 6
Needham, W. 489
Negret 928, 950
Neill, W. 1004
Nesmond, P. C. 352
Neville, C. 12
———, F. 148
Newall, R. S. 850
Newmann, J. P. 126
Newstead 62
Newton, A. 12
———, A. V. 204, 408, 420, 432, 488, 501, 537, 566, 588, 654, 659, 821, 882
———, W. 108, 199, 203
———, W. E. 188, 295, 316, 343, 485, 514, 563, 574, 613, 619, 622, 642, 660, 706, 749, 878, 909, 944, 998

Page
Niblet, D. 8
Nicholson, E. C. 685
———, J. 20
———, R. 20
———, T. 923, 946
———, W. 334
Nightingale, P. 7
Nixon, J. 661
Noah, J. 208
——, W.........................208
Noble, A. 743, 800
——, E. M. 71
Noel, A. D. 391
Noone, G. E. 983
Normandy, A. R. L.........308
————, L. A., junior ...594
Norrington, C...............1020
Norris, C. 540
Nutt, J. 6
Nyren, J. W. 171

Obert, L. H. 679, 687
Ogle, J. 11
Ogston, G. H. 503, 818
Oldham, W. 981
Oliver, J. 363, 530, 754
Oliver, J. 913
Olivier, E. M. 802
Ollivier, L. B. 637
O'Malley, P. 400
Orioli, Z. G. A. N. P. 636
Orioli, Z. *G. A. N. P*....914, 928, 950
Owen, E. 498, 524
Oxland, R...............217, 556
Ozouf, G. *H.* 688
Ozouf, G. H.....................891

Paine, J. M. 348
Pallu, A..........................861
Palmer, A. 1
Palser, J. B. 814
Paraf, A. 992, 1003
Paraf-Javal, M. 960, 992
Paris, C. E. 457
Parker, J. 37
———, J. F. 913
———, S. B. 641
Parkes, J. 92

Page
Parkins, T. 905
Parnell, E. A. 275
Partz, A. F. W. 525
Pask, W. 743
Paterson, W. 778
Pattinson, H. L.......176, 186, 266, 272, 303, 385, 391, 505
———, W. W.......239, 261, 319, 484
Paul, B. H. 529
Pease, H. 512
Peck, D...........................7
Peek, A. 816
Pelletan, P. 85
Pelletier, J. 109
Pemberton, H. 638
Pengilly, C. 962
Penn, H. 981
Penney, C. G. 968
Perkins, J. W. 425
Pernolet, C. C. P. N. 789
Persoz, J. F. 450, 628
Petrie, W....328, 338, 499, 692, 786
Pettitt, E. 329
Phelps, S. 67
Phillippi, F. T. 184
Phillips, J. A. ...349, 728, 918
———, P., junior 105
———, R. 112
Pickering, C. W. H.........276
Platt, T. 852
Player, J H 973
Plisson, D 417
Pochin, H. D. 440, 479
Polkinghorne, J. 833
Pollak, A. 876
Pollard, W. 207
Pontifex, E. A. 480, 503
———, W. 152
Poole, J. H. 998
Poole, M. 161, 399
Porion, E. 954
Possoz, L. A. 598
Potter, H. 925
Poulet, L. 932
Poussier, C. P. E. 691
Powers, E. 825

Page
Prelier, P. G. 254
Prentice, M. 551, 662, 696
Prentiss, E. F. 709
Price, A. P. 330, 422, 431, 571, 577, 911, 924, 940, 988, 1011
——, B. 18
——, D. S. 922
——, R. 6
Pritchard, J. D. 510, 515
Proctor, W. 540
Protheroe, E. 290
Pudney, S. 809
Pugh, J. 83
Pughsley, W. J. 894
Radley, W. 13, 220, 493
Ralegh, Sir C. 1
Ralston, W. H. 711
Ramseye, D. 2
Ransford, R. 961
Ransome, F. 1022 (*Appendix*), 382, 432, 445
Rawson, H. 269
Reade, J. B. 244
Readman, W. 829
Redwood, T. 678, 805
Reece, R. 418, 949
Reid, A. 12
Rémond, A. F. 979
Rémond, P. 997
Reynolds, A. 907
————, J. 158
Riatti, V. 568
Rich, O. 434
Richard, F. 642
Richards, E. M. 394
————, J. 941
————, W. 941
Richardson, T. 162, 265, 283, 313, 319, 344, 361, 373, 378, 420, 469, 512, 531, 551, 554, 576, 639, 648, 662, 664, 685, 696, 697, 750, 755, 761, 817, 840, 843, 921, 931, 975
——————, T. C. 498
——————, W. H. 933, 975
Rigg, R. 96
Ritterbandt, L. A. 519

Page
Robb, G. 364, 366
Roberts, A. 4
————, M. J. 323, 330, 334
————, T. 510, 515, 594, 769
Robertson, J. C. 251
——————, H. 970
——————, P. 752, 773
Robinson, G. 654, 674, 859, 865, 956, 1003
——————, H. 851
——————, J. H. 39
——————, T. 659
Rochaz, C. A. F. 259, 274
Rodgers, J. E. D. 197, 279
Roederer, C. A. 155
Rogelet, V. 633
Rolland, E. 569
Roman, J. 739
Roosen, A. L. 898
Rosse, J. 4
Rostaing, C. 477
Rotch, B. 297
————, T. D. 286
Rousse, J. B. T. 751
Rousseau Brothers 488
Routledge, T. 916, 921, 933, 975
Row, F. 917
Rowbotham, S. 1001
Rowe, L. 155
Rowland, R. 757
Rowland, R. 986
Rowlandson, T. 273
Rucker, M. D. 731, 756
Rücker, M. D. 931
Rudston, J. 2
Russell, W. 349, 368

Sadler, J. 90
Samuel, E. 145
Sanderson, M. 24, 26
Sautter, C. M. E. 196, 198
Savage, J. R. 876
Savory, T. F. 85
Saxelbye, J. S. 64
Scandalarus, N. 3
Schad, L. 873
Schaffner, M. 948

Page
Schinz, C. 561
Schlœsing, J. J. T. 569
Schlœsing, T. 422
Schlumberger, J. A. 829
Schmersahl, A. E. 439, 532
Schmettan, S. 7
Schmid, C. 831
Schnell, W 803
Scholfield, H. 426
Schrotter, A. 307
Schwabe, S. 420
Scott, A. 656
——, D. 20
——, G., junior 903
——, L. 296
Sedgwicke, W. 14
Seitz, A. 691
Seitz, A. J 691
——, C. D. J. 1011
Selmi, F. 502
Semeins, E. 8
Senior, W. 671
Severn, G. 974
Sewell, T. R. 128, 139, 179
Seybel, J. 192
Seymour, G. 611
Shanks, J. 183, 380, 429, 590, 870
Shannon, R. 25, 53
Sharpey, Sir R. 2
Sheffield, W. E. 78
Sheridan, C. 126
————, J. J. C. 112, 113, 124, 131
Siemens, C. W. 470, 533
Simmons, B. 113
Simon, J 635
Simoneau, A. C. 557
Simpson, G. 278
————, R. 226
————, W. 408, 785, 838, 902
Sinnock, W. 754
Slater, T. 339
Slatter, W. 671
Smets, J. T. 602, 632
Smith, A. 229
——, B. 180
——, C. 174, 684

Page
Smith, J. 91
Smith, J. 876
Smith, P. 1004
——, R. A. 402, 742
——, T. B. 353
——, T. J 879
Société Coignet, Père et Fils, et Compagnie 776
Solomon, P. J 366
Solomons, A. 263
Solvay, E. 866
Sonstadt, E. 819
Souchon, J. M. 337, 369
Southworth, T. 64
Spence, P. 121, 232, 298, 403, 426, 428, 467, 546, 587, 607, 708, 717, 741, 749, 764, 829, 835, 858, 874, 948, 985, 999
———, W. 679
Spencer, J. 79
————, T. 558, 583, 617, 642
Spieker, C. F. 383
Spilsbury, F. G. 127, 463, 485, 492, 580
Stace, W. R. 998
Stagg, J. D. 202
Staite, W. E. 362
Standley, H. J. 694
Stanford, E. C. 738
Stanhope, C., Earl of 54
Stanley, E. S. 367
Statter, W. 671
Steel, W. 72
Steigewald, F. 367
Stell, J. 13
Stenhouse, J. 491, 689, 720, 722
Stevenson, J. C. 474, 495, 840, 924, 1007, 1010
Stille, L. 844
Stocker, E. 218
Stone, W. 38
Stones, W. B 285
Storer, J. J 990
Stott, G. L. 465, 472, 492
Strachan, W. 77, 100
Stuart, J. 692, 756
Stubbs, J. 763

Page
Sutton, F. 966
Swan, A. 980, 1006
Swann, J. R...................985
Swinburne, R. W.............821
Swindells, I. 733
———, J. ...125, 156, 209, 299, 334
Syers, J. M. 565
Sylvester, J. 205
Symonds, C. E................523

Taillandier, L. A. 780
Tanner, J. 913
Tassy de Montluc, E. P. T. 494
Tatters, J. G..................742
Taylor, C........................39
——, G..........................39
——, H. 303
——, J. 84, 524
——, R., junior 349
——, S. 387
Tealdi, P. A. 122
Tebbutt, T. R. 134, 135
Tellier, C. 938
Tennant, C. 51, 54
———, J.......................109
Tessie du Motay, C. M. 898, 964, 994
Theroulde, F. A. 598
Thibierge, G. A. 467, 828
Thomas, C. 596, 815
———, C. J. 596
———, H. 596
———, T. 596
Thompson, A. T. 181
Thompson, G...................547
Thompson, J............628, 641
————, J., the younger 628, 641
Thornthwaite, W. H. 404, 867
Thwaites, J. H. B............393
Tilghman, R. A. 247, 248, 458
Tilt, J. 100
Titterton, C. 485, 487, 506
Tizard, W. L. 321
Tobin, T. W..................984
Todd, B...........284, 774, 967
Tolhausen, F..................751

Page
Tomkinson, R..................68
Tooth, W. H............868, 893
Torassa, J. B. C. 110
Tourniere, P. A. 381
Townsend, J. 553, 687, 713, 714, 721, 861
Trachsel, F.....................817
Troubat, F......................174
Trueman, A. 410, 416
Tudor, J. 903
Turnbull, A. 213
Turner, J.........................28
———, M. 91
———, W. G. 193, 207, 210, 219, 234

Vallance, J., junior 82
Vanderbrooke, J. 3
Vanderburgh, G. E. 679
Van Haake, C. W. B...........21
Van Waesberghe, J. F.......389
Vasseur, J. B. ...679, 781, 801
Vazie, R. 33
Verstraet, L. D...............802
Verstraet, L. D...............831
Verwey, A......................716
Vion, H. C. 357
Vivian, H. H. 311
Vogt, C.........................873
Von Seckendorff, R. 429
Von Seckendorff, R. 433
Vreem, W..........................8

Wagner, J. H. G. D. 609
Wagstaffe, M. F. 425
Walker, J....687, 714, 721, 806
———, P.....................522
Wall, A.................255, 338
Walsh, W...............842, 925
Walters, G. S 197
Wanklyn, J. A. 1003
Wanklyn, J. A...............1008
Warburton, H. 86
Ward, F. O....... 559, 885, 888
——, J. 15
——, P. 238, 333, 483, 733, 810
——, W. 7

Page

Wardour, Sir E. 2
———, W. 6
Warlich, F. C. 767
Warner, A. 767, 790, 791
Warren, W. 97
Waterton, H. 176, 191
Watson, H. H. 170
———, J. J. W. 339
———, W., junior 146, 206, 353, 387
Watt, C. 134, 135, 309
Way, J. T. 348
Wayt, J. 10
Weare, R. 753
Weatherdon, B. F. 978
Webster, J. 601, 691, 709, 732, 758, 810, 858
Wedekind, H. 895
Weldon, W. 971, 972, 987, 997, 1007
West, J. A. 699
Westhead, E. 711
Wetter, C. 660
Wheeler, G. P. 695
Whelpley, J. D. 990
White, J. 15
———, S. 276
———, W. 19
Whitelaw, A. 871
Whitmore, C. T. 4
Whitton, J. 57
Wiart, L. 882
Wiesmann, W. 160
Wildes, G. 177, 185
Wildsmith, J. H. S. 272

Page

Wilkinson, C. H. 91
———, J. 55
Willans, J. G. ... 626, 658, 730
Williams, J. 1
———, J. 188
———, W. 81
Williamson, J... 474, 495, 1017
Wilson, D. 85
———, E. C. 137
———, J. 146, 169, 444, 629, 682
———, J. T. 277, 300, 391
———, T. 742
Winsor, F. A. ... 65, 70, 71, 72
Wood, H. W. 110
———, S. T. 34
Woods, J. E. T. 993
Woolrich, J. 120, 143
Woolryche, T. B. 261
Wray, L. 431
Wreckshagen, C. F. 358
Wright, J. 101, 954
Wrightson, F. 643, 666
Wyatt, W. H. 68
Wynants, F. 559

Young, B. 583
———, J. 189, 270, 466
———, P. 106, 107
———, R. 926
———, W. W. 95

Zenner, D. 368
Zibelin, J. A. 528
Zink, J. 78

ACIDS, ALKALIES, OXIDES, AND SALTS.

ACIDS, ALKALIES, OXIDES, AND SALTS.

A.D. 1622, May 10.—Nº 20.

HAREWELL, Sir Edmund, RALEGH, Sir Carie, WILLIAMS, John, and CLARKE, Robert.—"Sondry kindes of " soapes, and also of making of soape ashes, pott ashes and salte " for soape."

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1622, October 5.—Nº 22.

ELAND, Christopher.—"Makinge of white and redd leade as " it is now made for painters, within our realme of Englande." The patentee " shall take and receive from " makers of the above if they will continue to make the same, " such a quantity of " redd lead as may bee conveniently sould within this our realme " of England and the said dominions yearly paying " " soe much " as himselfe and others have paid heretofore, according to such " quantitie and porc̃ons as the fower worke houses nowe " ymployed for the making thereof " (" Christopher Elande" being one) " doe nowe usuallie make by equal porc̃ons."

Surrender of Letters Patent, March 4, 1634.

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1623, February 23.—Nº 23.

JONES, Roger, and PALMER, Andrewe.—"Makeing of " hard soape with a materiall called berilia and without the vse o " any fire in the boyling and makeing thereof, and also of makeing " of softe soape without the use of fire in the boyling thereof." The " berilia " consists of the ashes of " beanestrawe," " pease-" strawe, and of English kelpe."

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1629, April 13.—N° 46.

RUDSTON, John, and CROOTE, Frauncis.—" A newe waye " and meanes to make white and baye salt of the sea water, sea " sand, and other materialls to be had, found, taken, and vse " between the highest water marke and the lowest water marke, " which shalbe as good and vsefull both for salting and ꝑservinge " as well of fleshe and fishe or other vses as any salt heretofore " imported from other countries."

[No Specification enrolled. Letters Patent printed, price 4*d*.]

A.D. 1630, January 21.—N° 50.

RAMSEYE, David.—" To multiplie and make saltpeter in an " open feilde in fower acres of ground sufficient to serve all our " dominions, to raise water from lowe pittꝭ by fire to make any " sort of millꝭ to goe on standing waters by continuall moc̃o " without the helpe of winde, waite, or horse; to make all sorts " of tapistrie, without any weaving loome or way ever yet in vse " in this kingdome; to make boates, shippes, and barges to goe " against stronge winde and tyde; to make the earth firtile more " than vsuall; to raise water from low places and myndꝭ and coale- " pittꝭ by a new waie never yet in vse; to make hard iron soft, " and likewise copper to bee tuffe and soft, which is not in vse " within this kingdome; and to make yellow wax white verie " speedily."

[No Specification enrolled. Letters Patent printed, price 4*d*. Mechanics' Magazine, vol 13, p. 64.]

A.D. 1630, October 2.—N° 52.

COPLEY, John, SHARPEY, Sir Robert, and HOBART, Anthoney.—" A peculiar newe way, mystery, arte, or meanes " for making white salt and bay salt with sea water and brine " without any such pannes or furnaces or other meanes as are " now in vse."

[No Specification enrolled. Letters Patent printed, price 4*d*.]

A.D. 1632, June 11.—N° 58.

WARDOUR, Sir Edward.—" A newe waie for makeing of " salt-peeter."

No Specification enrolled. Letters Patent printed, price 4*d*.]

A.D. 1632, December 3.—N° 60.

MURFORD, NICHOLAS, and HANWORTH, CHRISTOFER.—"The makeing of salt with salt water, and have found out a "newe way therein in the fuell furnaces, panns, and vseing "sev͠all materialls ꝓper to the vses of the same not formerly "ꝑctised to the exceeding advaunce and increase of that cōmodity, "the benefitt of the subject and our owne ꝓffitt, without ꝑiudice "or hindrance to any."

[No Specification enrolled. Letters Patent printed, price 4*d*.]

A.D. 1635, March 10.—N° 80.

VANDEBROOKE, JAMES, CULPEPPER, SIR THOMAS, and SCANDALARUS, NICHOLAS.—"A new way of makeing salt not "formerly practised in this kingdome, whereby they will be able, "not only to furnish our subjectꝭ with sufficient quantities of "good and merchantable salt at moderate and reasonable prices, "but to make vs an allowance of fower pence upon everie bushell "of salt made and sould by them to recompence vs for the losse "we may susteyne in our customes by the lesse importac̃on of "forraigne salt, and alsoe to export from hence yearely a good "ꝓporc̃on for forraigne partꝭ, and to ꝑforme this worke with "farre lesse vse or consumpc̃on of fewell than hath been heretofore ymployed that way."

[No Specification enrolled. Letters Patent printed, price 4*d*.]

A.D. 1635, March 25.—N° 81.

DE MAYERNE, SIR THEODORE, and CADEMAN, THOMAS.—"Distilling strong waters and making vinegars truelie wholesome "and verie comfortable to those whoe shall vse them, not by "working vpon mault made of wheate or barly to the misexpence "thereof, but by the vse of cider, perry, and bucke or French "wheat (a graine not hitherto vsed within our kingdome of "England, to other purposes than for feeding hoggꝭ and fatting "poultrie."

[No Specification enrolled. Letters Patent printed, price 4*d*.]

A.D. 1635, November 2.—N° 83.

FRANCKE, THORNESSE.—"The saueing of fewell, labour, or "ireon, and tyme heretofore unnecessarily spent and consumed

" by brewers, dyers, sope boylers, salt makers, and others of like " nature, whereby alsoe the annoyance of smoake is much " avoyded." The object of this invention is the saving of " tymber, wood, cole, and other fewell," and iron, by the "arte " and misterie" of "makeing of all sortꝭ of furnacies for melting " or smelting of copper, tynne, lead, iron, glasse, and all other " minerallꝭ whatsoever, and for the melting of metalꝭ for y^{e} " casting of all sortꝭ of ordinance and for y^{e} making of kilns for " the burning of brickꝭ, tyles, earthen pottꝭ, and lyme, according " to the ways and means by him so devised." This it is stated is effected "without either water blast, or foote blast, with saueing " more than a full third parte of the tymber, wood, coales, and " fewell now vsed therein, and with much less labour and farre " shorter tyme, whereby alsoe the great quantityes of ground now " vsed for theire pondꝭ and the abundance of tymber now spent " in makeing of theire dammes and pond headꝭ and continuall " expence of tymber in mayneteyning of them and theire water " courses, will be spared in great proporc̃on and the labour for " carrying theire materiallꝭ to melting, and the annoyances of the " highways thereby occasioned shalbe alsoe prevented or much " lessoned, and the vnnecessarie consumpc̃on and wast of tymber, " wood, and coale much saved."

[No Specification enrolled. Letters Patent printed, 4*d*.]

A.D. 1635, December 1.—N° 88.

ROSSE, James, and ROBERTꝭ, Alexander.—"A newe way " of makeing of redd and white leade, and glazing earthenware " with lytharge, out of which the silver is first extracted."

[No Specification enrolled. Letters Patent printed, price 4*d*.]

A.D. 1637, January 4.—N° 100.

HUGHES, Henry.—Making of barilia.

[No Specification enrolled.]

A.D. 1637, July 28.—N° 108.

WHITMORE, Capten Tho.—"The waies and meanes of making " vitrioll out of copper oare and of p̃paring copper oare and " drawing water from the same, soe as by the use of ye water " to make copper out of iron, and likewise of p̃paring of any

" manner of oare soe as by water to sepate the silver from the
" the said oare without melting the same."

[No Specification enrolled.]

A.D. 1637, November 6.—N° 110.

EVANS, John.—"Drawing and raising of waters from overflow-
" ing grounds, myne pitts, and coalepitts, by the use of engines
" by him invented, and also to use and practise within the said
" realms and đnions the refining and working of all mineralls
" and mettals, making and burning of bricks, tyles, lymestone,
" chalke, and other terrestriall and lapideous materialls, after his
" new invented order."

[No Specification enrolled.]

A.D. 1664, July 20.—N° 146.

HUTCHINSON, Samuell.—" A profitable and convenient way
" for the makeing and frameing of boyling vesselꝭ for salt workes
" and other vses, pottashes, and of pottꝭ for the melting of glasse,
" mettal and other mettalꝭ, and for the ordering and saveing of
" fire and fewell in the said workes in a farre lesse chargeable
" way, and in manner more beneficiall than ever heretofore hath
" in that way byne vsed or knowen (that is to say) of casting,
" makeing, and frameing the said boyling vessellꝭ, and other the
" like artificiall contriveances for the more easie and speedy
" evaporateing and seperating the water from the salt never here-
" tofore vsed in anie salt workes, copperice workes, allome workes,
" and other sortꝭ of liquors to bee evaporated, congealed, and
" condenced. As also a new and unknowen way of makeing pott
" ashes with tobacco stalkes and other vegitables, with the art of
" ioyning and mixing the volatile spirittꝭ with the fixed in the
" same. And likewise the true and right way of ordering and
" mixing the materiallꝭ for makeing of the said pottꝭ
" lasting, for the melting downe of glasse, mettall and other
" mettallꝭ and mynerallꝭ."

[No Specification enrolled. Letters Patent printed, price 4d.]

A.D. 1681, June 9.—N° 211.

MAYO, Edward.—(*A communication from Francis Fandell Du Fresue.*)—" A new invenc̃on of makeing salt."

[No Specification enrolled. Letters Patent printed, price 4d.]

A.D. 1682, July 31.—N° 222.

MARBURY, William.—(*A communication from John Dason.*)—
" A new invention or way for the makeing of salt cheaper and
" better than any was ever vsed beforee in any of our dominions,
" which being tryed many yeares since before persons of the best
" quality and skill in such affaires was approved as a thing that
" would (if putt in practice) be of generall vse and advantage to
" our subjectꝭ, and that he haveing since much improved the said
" invenc̄on by severall new addic̄ons, and alsoe found out an other
" very vsefull invenc̄on for the dreining and drawing of water out
" of brine pittꝭ and mynes with greater ease and speed and lesse
" charge than is done by any other meanes yet vsed for the like
" occasions."

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1685, Aprill 13.—N° 245.

MOORE, Thomas.—" A way for makeing better allom, and in a
" cheaper way, then is used or ever was att any such worke, and
" also out of the sayd allom mines to make curious christalline
" allom of allom-glasse for severall good uses and ornaments for
" the publick good, and preparations of allom with other matters
" for medicinal, chirurgicall, mettallick, and minerall improve-
" ments, being new inventions never yett practiced in any of our
" kingdomes or dominions, and of great advantage to all our
" loveing subjects."

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1691, February 7.—N° 266.

PRICE, Robert, WARDOUR, William, BARRY, Andrew,
and NUTT, John.—" A new way and method of makeing salt-
" petre in great quantities and at farr lesse charge than in the
" com̄on way."

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1691, August 26.—N° 270.

NEALE, Thomas.—" A new way of makeing verdigrease in this
" our kingdom of England, and of boyling the same in wooden
" or other panns, and alsoe of makeing panns or vessells of wood
" for boyling the said verdigrease, or any other things."

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1693, January 31.—N° 314.

GREEN, John.—" Such a way for converting stone and chalke " into lime, that by the heate thereof water and other liquors or " liquids may be heat or boyled and made fitt for severall vses."

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1693, September 14.—N° 328.

BENNETT, Thomas.—" A new way of makeing salt, which, for " all vses is better then any foreigne salts."

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1697, September 4.—N° 351.

LYDALL, Robert.—" New way of separateing silver from lead, " and makeing litharidge and redd lead of the lead when parted, " performed in a close furnace with sea coales."

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1706, March 15.—N° 375

PECK, Daniel.—" A new and more easy method for the better " makeing and refining of white salt for all vses, from sea water, " brine springs, and rock salt, either in iron, lead, or copper " panns, over a reverberating air furnace or furnaces, whereby " a much lesse quantity of coal or other fuell is expended than by " any other method now vsed for the making of such salt."

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1709, July 12.—N° 384.

SCHMETTAN, Samuel.—" Making of salt within that part of " Great Brittain called England, dom̃on of Wales, and town of " Berwick-upon-Tweed." It is stated that hitherto salt has been made by " boiling salt or salt water " with coals, but that this is a new " method in boiling."

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1716, September 14.—N° 409.

WARD, William.—" A new method makeing & setting the " vessells vsed in makeing of salt, allum, copperas, &c., as well as

" other things when large furnaces are required, much better and " with lesse danger & expence than could be done by any method " before practised." " By this invenc̃on a double pan is made & " fixed upon a solid basis of brick or stone, and the fire is con- " veyed by meads of igneferous tubes through the liquour so as to " make it boil with more dispatch, and without any hazard to the " proprietors or danger to the workmen."

[Printed, 6*d*. Drawing.]

A.D. 1717, August 1.—N° 416.

CAMPBELL, George.—" A new improvement of salt, which by " a separate preparac̃on of the sea liquor, or other pitt or salt " brine, considerably augments its quantity, and by removing the " bitter or corrosive nature of the salt betters its quality more " than any other way or method hitherto used in any of his " Majesty's dominions." This consists of " two different vessells " soe placed and erected as to have communication one with the " other." In one vessel " the sea liquor is boiled vp with a violent " strong fire " till it is about one-tenth the bulk, " and thereafter " is conveyed to another pann or panns, wherein the salt is per- " fectly made by a governed fire."

[Printed, 4*d*. No Drawings.]

A.D. 1718, January 15.—N° 417.

SEMEINS, Edward.—" The vse of certaine vegetables in his " Majties dominions in America never hitherto made vse of or " applied by others for making pot ashes and other valuable vses " in greater ꝑfecc̃on than any ever yett made, and as good as any " ever imported hither from any country whatsoever, which will " not only increase the revenue of his Majesties customs, but will " be of great advantage to all his Majesties subjects who make use " of pot ashes in their severall trades, such as glassmakers, soap- " makers, and for the woollen and linnen manufacture, &c." These are " the stalks, stems, & roots of tobacco, yams or " yambas, wild vines, & potatoes."

[Printed, 4*d*. No Drawings.]

A.D. 1720, June 25.—N° 430.

DESAGULIERS, John Theophilus, NIBLET, Daniel, and VREEM, William.—" For making the steam and vapour of

" boyling liquors vsefull for many purposes, and particularly for " drying malt, hops, starch, and other humid substances, and for " baking, brewing, distilling, boiling, and making of salt better " and with a less quantity of fire, without mixing the fiery particles with the several substances so much as in the ways cōmonly vsed."

Other applications of the use of steam and vapour of boiling liquors beside the above named are given.

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1722, March 30.—N° 440.

MILLER, Thomas.—There is no title to this invention, but it is for the burning of bricks, tiles, and lime, the object being to burn bricks "all hard, and by consequence (there being little or " no waste)" bringing "about the practice of vsing universally " good bricks instead of bad, but also by affording them full as " cheap, or probably cheaper, than the bad ones now sold for, " which would be also of great vse in burning of tiles and lime " as follows:—First, to burn bricks" in the bottom of the clamp as they ought to be, a grate or floor of iron, bricks, or other material is to run the whole length of the holes where the fire is vsually laid, in such manner that more or less fire may be applied as occasion requires to dry the bricks gently to such a degree as shall rightly prepare them to receive the strong fire at last.

Second. "The method for right burning the bricks on the outside is this:—A strong wall is to be built quite round the " clamp, only with small overtures to convey in such a quantity " of air as shall feed a wast fire between the wall and the clamp " placed vpon several stages."

Third. "For securing the bricks which lye on the top of the " clamp from the wet, that they may be as well and thoroughly " burned as the rest. A covering is to be made of pantile or " other material never vsed in clamps before, and the method " above described or mentioned being vsed in burning of bricks " it will cause such proper heat as that tiles or lime may be burnt " on the top of the clamp at the same time."

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1726, July 21.—N° 484.

HINTON, William.—" Certaine new discoveries and improvements in extracting, cureing, and calcining the lixiviate salts of

" ashes of wood or other vegetables." These are "tempering, " curing, qualifying, and prepareing either the lixivium or the " fixed salt of vegetable ashes by a mixture of aluminous or " vitriolick salt," and "after fermentation, ebullition, or working " on the alcalizote salts, reduce the same into a salt of a new " kind and different effect in operation, and which being afterwards calcined in proper furnaces becomes a potash, pearle ash, " or fixed neutral salt" equal to any imported.

[Printed, 4d. No Drawings. Rolls Chapel Reports, 6th Report, p. 117.]

A.D. 1727, January 16.—N° 488.

WAYT, John.—"A certaine invenc̄on, way, and method to save " coals or other fuell usually burned in boyling brine and makeing itt into salt." This "consists in placeing and fixing certain " bars of iron & certain walls of brick or other propper materialls " by which the heat is first contracted and after by funnells conveyed with greater force to all parts of the pann or other vessell." By doing this, "as occasion offers," "two, three, or more of the " panns now com̄only used in boiling brine" may be boiled "with " one fire only, and att the same time."

[Printed, 4d. No Drawings. Rolls Chapel Reports, 6th Report, p. 117.]

A.D. 1730, November 7.—N° 523.

HUTCHINS, Samuel.—"A method of extracting and preserving the sulphur contained in mundic, with which several " counties in this our kingdom do very much abound, and " which at present is of no advantage to the owners, but on the " contrary, an incumbrance on the land where it lyes; that this " sulpher, by proper preparac̄on and refineing will answer the " end of that imported from abroad."

[No Specification enrolled. Letters Patent printed, price 4d.]

A.D. 1738, July 1.—N° 564.

CHAMPION, William.—"A method or invention for the " reducing of sulphureous British mineral and mineralls into a " body of metallick sulphur." This is "the reducing or " rendring of a metallick sulphur from calamy or other " sulphureous British mineral or minerals into a metallick " sulphur known by the name or names of spelter or toothaneg."

[Printed, 4d. No Drawings.]

A.D. 1741, April 24.—N° 574.

OGLE, JAMES.—" A new sort of boiler and furnaces for boiling " sea water to make salt thereof; by which means sea salt may " be made as good, much quicker, and at less expence than by " any other method hitherto used and discovered, and which I by " and at great pains and expence have brought to perfection." These are " a granulating part for the making of salt and a pre- " parative part for the boyling of brine." The vessels are composed of iron towards the bottom and wood at the top, they are fixed on a hearth " of stone or brick, the bottom of the " granulating part and the sides and end of the preparative part " composeth a furnace wherein the fire is lodged, which acting " round the inside of the preparative part and the bottom of the " granulating part, maketh both the granulating part and pre- " parative part opperate together." The flue is made " invironing " the preparative part on the outside thereof if need require."

[Printed, 6*d*. Drawing.]

A.D. 1741, November 19.—N° 580.

HARRIS, THOMAS.—" Making saltpetre or nitre." Four tons of slacked lime are sifted with one ton of common salt, rock salt, sea salt, salts of all salt springs and nitre springs, or salts of any kind from fish, flesh, or animals or vegetables, and calcined in a furnace, and the result put under a shed and watered with urine of any kind or a liquor prepared from any vegetable matter, " to which " must be added equal quantities of slacked lime and wood or " other ashes, which, after sometime is to be kept to water the " above earth as the same becomes dry. The earth thus prepared " lyes exposed to the air till it is fit to mix with water, in order " to draw the lixivium away, which being filtered thro ashes or " sand, must afterwards be boiled up to saltpetre." " Saltpetre " or nitre may also be produced by a commixture of animal " substances " fermented or putrified. " To all the liquors pre- " pared for watering " " should be added a small quantity of " spirit of nitre and fixed nitre."

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 6th Report, p. 120.]

A.D. 1743, April 4.—N° 590.

NEWTON, AMBROSE.—" A new method of making allom out " of dross or dreggs (com̃only called settler slam and slam-pan " slam) of the liquor out of which other allom is made, which " hath hitherto been esteemed of no use or service." " Slam is " dissolved in water, and boyled in a leaden pan " until " it comes " to a state of forty-five pennyweight, after which give the pan " one eak of water. When boyled down two inches, the liquor is " drawn off into a settler, intermixt with lees made from kilp and " slam." On the dross settling " the clear liquor is drawn off " into a cooler, and intermixt and brought down with urine to " thirty-seven pennyweight, and stands three or four days, and " strikes into small allom."

[Printed, 4*d.* No Drawings. Rolls Chapel Reports, 6th Report, p. 121.]

A.D. 1744, June 22.—N° 604.

NEVILLE, CHARLES.—" A lime, stucoe, plaster, mortar, cement, " and manure, of and from cockle, oyster, and other sea shells, " by grinding, pounding, or burning the same." This consists, in reference to this subject, as follows, for making " the fine lime, " stucoe, plaster, or cement," the above shells are put " into a " kiln with Newcastle or Welsh coals (which are the best for the " purpose), or any other coals, and when the shells are suffi- " ciently burnt draw them out of the kiln, sever the ashes from " the shells by a cieve or skreen, and then pound or grind the " said shells in a mill to be erected for the purpose." For making the strong lime, when the shells are " sufficiently burnt in the kiln " as aforesaid, draw them out of the kiln and slacke them with " water, and when so slackt sever the meal from the ashes by a " fine cieve or skreen."

[Printed, 4*d.* No Drawings. Rolls Chapel Reports, 6th Report, p. 121.]

A.D. 1744, July 13.—N° 606.

REID, ANDREW.—" A way to make bay salt in this kingdom by " the heat of the sun only, free from mudd, and perfectly fit for " all the uses to which bay salt is applyed, and that too in a " degree at least equal to what is imported from France." " The " brine is evaporated to such a degree that little films, pellicles, or

" chrystals of salt begin to appear on its surface," when it is drawn into "chrystallizing pans," "terrassed or paved with any " sort of stone, tile, brick, plank, or any such material," so as to reap the full benefit of the sun's heat. "Glass or earthen pans " may be employed." Besides the usual ways of evaporating brine "to a kerning strength, the following may be of use in any " fair weather." "A reservoir or cistern being covered with a " tiled penthouse, the brine is by a windmill or other engine " thrown up to a gutter on the ridge thereof, from whence it runs " down the sides of the penthouse and falls back in the reservoir, " till, by being thus exposed to the sun and air, the moisture is " sufficiently exhaled, and the brine ready to kern."

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 6th Report, p. 121.]

A.D. 1744, July 19.—Nº 607.

RADLEY, William.—" A new sort of invention by furnaces " for boiling sea water to make salt thereof, by which means sea " salt may be made as good, much quicker, and at less expence " than by any other method hitherto used or discovered, and " which I by and at great pains and expence have brought to perfection." This consists of a pan or boiler " fifteen inches deep " or therabts," placed "horizontally on or over a furnace consisting of two fires divided in the middle by a wall, upon which " are placed staples of stone or iron which supports the middle of " the said pan or boiler." "The fewell or coals are thrown into " the said furnace at two or more mouths or doors at the end or " ends thereof, and the smoke is conveyed by flewes into two " chimnies, one at each end of the pan or boiler."

[Printed, 6*d*. Drawing.]

A.D. 1745, April 18.—Nº 612.

KAY, John, and STELL, Joseph.—" A new invented engine " or loom for working and weaving of tapes and all other goods " in narrow breadths made of woollen, linnen, silk, cotton, and " mohair; and also a new invented kiln for the drying of malt, " and likewise a new invented pann or kettle for saving of fewell " in the making of common salt." The invention relating to this subject is as follows :—" fixing to one end of the pan now " used for evaporation another new invented pann or kettle made " of iron ," with a head or cover from which a pipe " extendeth

" through the old pan in the length way in an angular position." " The flue being made under the bottom of the small pan is " carryed in a flue round the same, and so forward under the " large pan in angular flues untill the heat is spent."

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 6th Report, p. 158.]

A.D. 1746, April 1.—N° 616.

LINDEN, Diederick Wessell.—Making of saltpetre.—" Take " com̃on salt or salt water, lime, scorios of iron, or stones which " have iron in them; loom, and all sorts of green vegetables; all " manner of animal productions, as urine, dung, blood or flesh." This is putrified in a pit, afterwards exposed to the air, and when dry the saltpetre is lixiviated out, to which so much caustic alkali is added, when it is boiled " till the liquor when thrown on the " fire burns," when it is cooled and chrystallized."

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 6th Report, p. 122.]

A.D. 1747, July 27.—N° 623.

LUCAS, Samuel. — " The erecting salt pans for the boiling " of salt." This consists of two oblong pans (one nearer the fire-places than the other), at the end of which is a square room for stoving the salt. A brick partition running along under the first pan " divides the fire, and supports the bottom of the pan, at the " further end of which is fixed an iron regulator for moderating " the heat." There are " bars of brick which form a crooked " flue under the second pan, which is continued from the first and " carried under the second pan to the drying room." The flue is continued from thence nearly round the whole of the drying room, terminating in a chimney towards the centre of the room. " This " flue is 18 inches deep, and the top of it is covered over with " iron plates, also the sides of this flue rise 3 feet above the plates " which cover it. Then a covering of wood lined with tin falling " upon those sides forms a kind of ring, wherein the wet salt is " put to dry."

[Printed 10*d*. Drawing. Rolls Chapel Reports, 6th Report, p. 122.]

A.D. 1749, February 23.—N° 641.

SEDGWICKE, William.—" The art, mystery, or method of " making a drugg called sal ammoniack, or armoniack, of greater " purity than any hitherto imported from foreign parts."

" Bones, horns, blood, or any animal substance " are placed " in " a large iron pott with an iron head and an earthen or glass " receiver," and gradually heated, the heat " increasing for ten, " twelve, or four-and-twenty hours," according to the size of the vessel and bulk of the material. After the distillate has stood twelve hours, the oil floating on the top is taken off, and the salt and spirit are rectified twice by distilling from a large retort embedded in a sand bath. After which the distillate is saturated with spirit of salt made as afterwards described, filtered through paper, and evaporated in a sand bath gently in vessels of glass or earthenware to perfect dryness, yields " cakes of true sal " ammoniac."

The spirit of salt is made by distilling from an " earthen long " neck " placed in " a reverberatory furnace," a mixture of 1½ lbs. of ground and dry sea salt, and 4½ lbs. of dry " powdered tobacco-" pipe clay, or fuller's earth, or indeed any clay," mixed well together, having a capacious receiver; the heat is " encreased " gradually for ten hours that the long neck may be of a moderate " red heat; continue this heat for five hours longer, by which " time your operation will be finished."

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 6th Report, p. 157.]

A.D. 1749, June 23.—N° 644.

WARD, Joshua, and **WHITE**, John.—" A certain acid spirit of " sulphur with sulphur & saltpetre, which in all things answers " and in some excels oyl or spirit of vitriol." The " acid spirit of " sulphur is made by powdering and mixing a proportionable " quantity of rough stone, or flour of brimstone, and saltpetre," and putting the mixture into a glass vessel and setting it on fire, " which by burning afterwards condenses into an acid spirit of " sulphur." The quantity of sulphur and saltpetre cannot be ascertained, as they differ " not only according to the quality of " the sulphur and saltpetre, but also according to the various " seasons of the year and different weather, where the air has at " various times so extraordinary effect that without proper altera-" tions the matter yields not above half the quaintity of spirit as " at other times, for which changes it is impossible to give any " general rules, nor is it to be known but by observations and " experience."

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 6th Report, p. 123.]

A.D. 1749, July 1.—N° 647.

JEWERS, Daniel, and LODGE, William.—" New invention or method of making pearl-ashes full as good as any made " abroad beyond the seas, and in much greater perfection for use " and strength than what is made in the kingdom of Prussia or " elsewhere, and at a much cheaper rate." " Eight or ten deal " vatts sufficient to contain about 60 or 70 bushells a piece " have under " each vatt in the ground " an " underbeck likewise " of deal." The upper vat has a hole of an inch diameter in the bottom; the upper vat is filled with wood ashes, which are drenched " with small lye and water till all the salts are drained from it, " and when the lye becomes too weak to bear an egg, its esteemed " too small for boyling, and is then laid upon a fresh vatt of ashes " instead of water," so " that the whole number of these vatts are " worked round, one under the other, in a regular succession." The lye is evaporated to dryness in a pan. The salts are placed in " a reverberating furnace built in the fashion of an oven." " The fireplaces are entirely separated from the middle of the " furnace for two feet and a half in length both at the front and " back." The salts are placed " in the middle of this furnace, " great fires of pealed oaken wood are made on each side," are " kept up until the goods are made of a fine pearl colour," stirring being kept up during calcination.

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 6th Report, p. 123.]

A.D. 1749, December 13.—N° 651.

CREED, Sir James.—" A method or way of making white " lead, and also of casting lead which is to be used for milling " for the covering of churches, houses, and other buildings." The matter relating to this subject is as follows :—Making " white lead " by the heat of fire (instead of horse dung, hitherto the common " method), placing in chambers, rooms, stoves, ovens, or other close " or confined places heated with fire, lead cast in thin plates, and " raising or conveying therein the steam or vapour of vinegar or " other acid raised by fire " till the plates " are corroded thereby into " flakes or dust of white lead." The steam or heat is to be regulated by " sliders, stopples, valves, stopcocks, or the like," and discharged into the air or collected in a still head, and condensed by a refrigerator.

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 6th Report, p. 124.]

A.D. 1751, April 18.—N° 663.

BAKER, John, and BARKER, John.—"New invention, art, "or method of making fine pott ashes, coṁonly called pearl ashes, "as good as any imported from abroad." A strong lye is obtained by pouring water upon ashes from wood, ashes of tobacco, or of the stalks or refuse of tobacco or of any other vegetable, and is evaporated in an iron pan, and the remaining salts "much in the "form of brown sugar" are put into a brick reverberatory furnace, and are heated "for a longer or shorter time with a stronger "or slower fire, according to the use they are intended for, or the "colour required." At one end of the furnace the fire is made, and between such fire place and the furnace is a partition about one foot higher than the bottom of the furnace, over which the flame passes on to the salts, and out through a chimney at the other end.

[Printed, *4d.* No Drawings. Rolls Chapel Reports, 6th Report, p. 125.]

A.D. 1754, February 21.—N° 689.

BOWMAN, Kemp, and CATHERWOOD, William.—"A "method entirely new of making salt from sea water, by applying "and adapting a certain machine not hitherto used for that purpose, which machine is also so altered and contrived as thereby "to extract and draw off spirits in a shorter time and at a less "expence than was then practiced, and yet perfectly pure and "limpid." The matter relating to this subject is as follows:— The salt is made by distilling off most of the water of the sea water, emptying "the vessel into an open pan," and boiling "off the remainder," and "so in the conclusion to take care of "the salt in the pans as in the method now practised."

[Printed, *4d.* No Drawings. Rolls Chapel Reports, 6th Report, p. 127.]

A.D. 1755, February 10.—N° 697.

NIGHTINGALE, Paul.—"New method of making saltpetre "from vegetables." "Preparing land and sowing" seeds "of "all kinds of cabbage, savoys, brocolo, borecole, and all the sorts "of colewort, Scotch and sea cale, purslain, nightshade, and all "other vegetables of a nitrous quality." When properly grown "these are gathered, laid in a heap, and to the produce of every acre is added "10 cwt. of woolen raggs, with some kelp or sea "weeds, then to be laid in pitts or heaps to ferment or putrifie till

" they come into earth. The spirit or salt is afterwards to be drawn " from the above earth with water, and evaporated with fire, as in " the manner of making other salts."

[Printed, 4*d*. No Drawings.]

A.D. 1756, September 9.—N° 710.

ARD CHARLES.—" Peculiar new invented method of manufac- " turing salt and other things." This is said to be effected by arrangements of hot houses and boiling houses, the object being with "glass skylights to contract ye suns heat to ye making backs " in the hot houses."

[Printed, 6*d*. Drawing.]

A.D. 1760, November 27.—N° 754.

PRICE BENJAMIN.—" Working and boyling liquids, and work- " ing of the wast water therefrom, and bring them to a proper " consistance for working salt from salt water, salt from salt " spring, and salt from rock salt when dissolved, copperass mak- " ing, or clarifying saltpetre, and working of spirits, sooner and " by a shorter method than then practised or used, and at less " expence." Pans are set "in such a manner that the fire put " under the first pann may pass under the second, third, or any " other pann."

Pans for salt are of cast-iron plates placed on an iron frame with cement; "then by a wheel or wheels made with ladles " or bucketts which works in the boyling liquids, and a continual " blast of air regulated by a stop cock" "forced through the " same by a pair of double bellows or other blast conveyed by a " pipe to the bottom of the liquor" carries off greater steam than by any other method. " The wheels and blast are put in motion " by mill work, and may be adapted to distilling; making the " worm with more turns in it, and bigger for the still than " usual."

[Printed, 4*d*. No Drawings.]

A.D. 1761, February 6.—N° 760.

MACKAY, JOHN, and GREENALL, JONATHAN.—" A new " method of making and manufacturing of salt." The pan may be of many shapes "from 30 to 300 feet long, from 16 feet to 95 "feet wide and from 4 to 24 inches deep, with fires from 1 to "50 on each side, or only on one side, as may be thought proper, "with a hot house either at one or both ends or placed behind "the front fires, either circular or oval, and of any size from 20 "feet to 2000 circumference within the walls, with one or more "chimmeys and air channels to be placed where most convenient." "The air channels, some crooked, some straight, or all crooked "or all strait, and from 1 to 100 in number. The refiners from "6 inches to any depth that shall be found most proper. The "fires under them from 1 to 10 in number, and the fire places "together with the refiners to be made of any size or form" most convenient. Some small pans "may only require one refiner "and one hot house, and one large air channel and several side "ones which may run" into different parts of the house. "The scalding boiler to contain from 10 to 2000 gallons, and of "any form, to have a fire or fires under it, and therewith to be "fixed or moveable. Some may be made with fires in the front "and hot houses behind."

[Printed, 6*d*. Drawing. Rolls Chapel Reports, 6th Report, p. 157.]

A.D. 1762, January 25.—N° 767.

WHITE, William.—"New invented manufacture of crucibles "for the melting metals and salts, &c., called by the name of white "crucibles or melting potts, made of British materials, and never "before made in England or elsewhere, and which I have lately "set up at Fulham aforesaid." Take "Sturbridge clay and "Dorsetshire clay calcined; mix them with Woolwich sand and "water, to be trodden with the feet and then burned."

[Printed, 4*d*. No Drawings.]

A.D. 1764, April 30.—N° 812.

BAKER, John.—"New invented art or method of making salt, "of the like kind and quality and in all respects equal in use "and goodness with the salt commonly called bay-salt or white "salt, usually imported from France and Spain, and which is "used in salting and curing of fish and flesh." "Brine fully "saturated with salt, either by boyling in common salt pans, or "exposing sea water to the sun's beams," is put into a pan over a furnace, and heat is given "to the surface of the brine in the "pan equal to or rather more than what is given to the bottom

" of the brine, which is effected by drawing the heat over the " pan, which hath already passed under the pan," by means " of " an arch formed over the whole length of the pan and of the " space at the end of it."

[Printed, 6*d*. Drawing.]

A.D. 1765, June 18.—N° 831.

HOLME, Peter, CROPPER, Edward, NICHOLSON, James, and NICHOLSON, Robert.—"A new method of making " large quantities of allom, from liquor made from copperas " materials and uncalcined ore, equal in goodness to the best " English allum, which had been demonstrated by the repeated " trials or experiments of several eminent manufacturers; that " we apprehended by the means of our said invention the dyers " and other manufacturers of this kingdom might be supplied " with the said commodity in very large quantities, which would " tend not only to reduce the price thereof, but also encourage " the exportation, and be of publick utility." "Take equal " quantities of stale urine and copperas liquor made from uncal- " cined copperas ore or pyrites, to which add one-fifth part water, " and one-tenth part kelp ley, mix all well together, let stand to " depurate, and decant the clear liquor; evaporate it to a pelicle " and set by to chrystalize."

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 6th Report, p. 134.]

A.D. 1767, March 13, N° 870.

DELAVAL, Thomas.—"The means of making kelp, by burn- " ing the sea-weed at all seasons of the year wett, immediately " after it is cutt from the rocks or driven upon the shore, without " any farther preparation, a method never before in practise; " which invention would be of great utility to the publick in the " reduction of the price of that commodity." " Taking the kelp " or sea-weed," and burning it without any preparation, in " reverberatory or draw kilns, with coal, wood, or other kinds " of fewel."

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 6th Report, p. 135.]

A.D. 1772, March 4.—N° 1006.

SCOTT, Daniel, and MACKAY, John.—" Making of salt from " sea water or brine by steam." " One salt pan or vessel " is fixed over another salt pan or "vessel into which sea water or "brine is to be put," these are "cemented together," and "an "additional pan or other vessel made of lead or any other metal "or material, at least four times as big as the other pans or "vessels, if not bigger, with a double bottom, is to be placed as "near as can be to the other pans or vessels," and a pipe or tube conveys the steam from the under vessel, through the upper vessel, "to the large pan or vessel make of lead or any other metal or "material," by which means both are "kept always hot." An opening is made at the further end of the large vessel, "for the "fresh water which is made by the steam condensing as it passes "through the double pan of the large" vessel to run away. The under vessel is always "kept boiling, and emptied by means of a "cock, as the brine grows strong," into the large vessel. This process is conducted either over a common furnace fire "made "upon an arch, which arch may be filled with liquor underneath, "which will receive a considerable heat from the fire above," or "over an oven constructed for making cynders," and the oven "covered at the top with the salt pan" or boiler, also "built "upon an arch for the same purpose as the furnace." "Vessels "may also be fixed with flews running through them from the "chimney," and shallow "vessels may be made to swim in the "hot liquor" in the other pans or vessels.

[Printed, 4*d*. No. Drawings.]

A.D. 1772, April 30.—N° 1015.

VAN HAAKE, Christian Wilhem Baron.—"New invented "secret art or mystery in extracting and making from a certain "mineral several compositions called mineral tar and mineral oil, "which I substitute instead of tar or liquid pitch intended and "used for the bottoms and other parts of ships and navigable "vessels, also vitriol, saltpetre, lamp-black, and caput-mortuum "of the said mineral." A "particular quantity of the water "drained from mineral tar from the distillation of coal" is put into "a hole dug for that purpose in the earth, and covered over "so that no air can get to the same, and let lye there till impregnated;" this is named "saltpetre." "A particular quantity" of the same water "thrown loose on the ground" becomes impregnated with air, and is named "vitriol." "The residuum "dregs or dross" is named "caput-mortuum." The smoke from the fire is collected by a hood, and is named "lamp-black." "The different species of tar, vitriol, and saltpetre" mixed together "in their respective due or fit proportions," named "mineral or mineral oil" is used for "ships, vessels, (and "timber)."

[Printed, *4d.* No Drawings. Rolls Chapel Reports, 6th Report, p. 162.]

A.D. 1773, March 19.—N° 1036.

HEYS, John.—"A method of making lees and ashes from marl "and other materials for bleaching of cloth and yarn, and for the "use of soapers, dyers, and others." Marl is burnt in a kiln with bars "about a yard from the bottom," so that "it may receive air "during" burning; the result is mixed with "kelp, salt water, "fresh water, turf ashes, soot, lime oyster shells, and fullers "earth" in a cistern, and after four or five days the "liquid or "lee" is drawn off and boiled until "it will bear an egg," when "some lime water and aquafortis" are added, and the whole is evaporated down in a reverberatory furnace "cased with iron to "prevent the matter from running out," when it is drawn off "into an iron pan, and upon growing cool it becomes hard and "fit for use."

[Printed, *4d.* No Drawings. Rolls Chapel Reports, 6th Report, p. 139.]

A.D. 1775, October 27.—N° 1104.

DE BRUGES, Pierre Theodore.—"A new and peculiar "method of making saltpetre." "Take separately or together" "sea salt," "fountain salt," "mountain salt," "sal gem," "vegetable salt," "vitriolic vegetable mineral," "animal salt," fermented "by the wet way or by the dry way. The base or basis "of the aforesaid fermented salts" are united "with either "animal or vegetable phlogiston, or with both together, which "phlogistons are to be calcined by the wet putrifying way, or "distilled according to the custom of distillation." These "compose saltpetre by the means of earth, water, and air, which "co-operate to the perfection of the saltpetres." "As soon as "the saltpetres have arrived at their degree of perfection" "you "must filter them according to the usage of saltpetre makers, to "extract the saltpetres therefrom by means of evaporation and

" christallization." This impure saltpetre is purified " by separating from it all its impurities, as earth and sea water."

[Printed, 4d. No Drawings. Rolls Chapel Reports, 6th Report, p. 162.]

A.D. 1777, May 13.—N° 1155.

MANTELL, John.—" A method of making and refining the " common and sea salt for curing of fish, flesh, and divers other " usefull purposes, to much greater perfection and purity, and " superior to any hitherto used or made; and that out of the " offals and salt so purified he prepares a manure, which, if used " as such, will, in the course of two or three years, by its attrac- " tive quality, impregnate the soil with saltpetre, so that per- " petual saltpetre mines may be established throughout the " kingdom."

" The method of making common salt is by boiling or evapo- " rating the brine to dryness." To refine the same, mix " com- " mon salt and quicklime in equal quantities; form these " ingredients, when slacked, into balls," which burn in a furnace or kiln; " then extract the salt out of the lime with warm water; " evaporate the water, and dry the salt;" the residue is the manure.

[Printed, 4d. No Drawings.]

A.D. 1777, July 19.—N° 1163.

BAILEY, Alexander Mabyn.—" A machine for making " fresh water from sea water or brine springs without boiling, " which will be pure element without spirit of salt, bitumen, " heterrogenous matter, and for making salt from sea water or " from brine springs, with much less boiling than in the common " way of boiling it." " This machine consists of five parts, " viz^t:—First, a large pair of bellows on a strong frame; secondly, " an iron stove, with a tube or pipe which conveys the air (from " the bellows) through the fire into a dodecagon frame (or " barrell); thirdly, an iron pan with a groove (or channel) on " its upper edge to receive the cover (or condenser), and with a " pipe at the bottom, to draw off the salt water when needful; " fourthly, the dodecagon frame (or barrell) covered with flannel " (or coarse canvas), which revolves on two concave cylinders, " the one to convey the hot air from the stove into the dodecagon

" frame (or barrel), the other is to let out the air occasionally;" fifthly, the cover (or condenser) with a groove (or channel) on its inside to convey off the fresh water; on its outside is a pipe which communicates to the groove (or channel) aforesaid; the upper part of it has a conic roof, and is a reservoir of salt water " to supply the pan when wanted." "This machine may be " worked by hand, horse, wind, or water."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 5, p. 320.]

A.D. 1778, December 21.—N° 1203.

SANDERSON, Matthew.—" New process for the extracting a " mineral sulphur from pyrites, copper, and lead ores, separating " its acid, and rendering it usefull for every medicinal purpose." " Forming a quadrangular pile of sulphurous pyrites, copper, or " lead ores upon a bed of fuell placed upon air pipes, leaving one " or more channels from the upper part of the pile downwards, " covering the whole surface of the pile with antiphlogistic " matter, to prevent as much as possible the exalation of " sulphureous fumes, as well as to concentrate the heat; being " then ignited, the sulphur is to be obtained by eliquation." Or they may be burned in a building, furnace, or kiln, of stone or brick, and communicating with a large recipient, in this way forming acid. The crude sulphur is refined by " ablution, " excication, eliquation, or distillation, and lastly by sublimation."

[Printed, 4*d*. No Drawings.]

A.D. 1779, April 30.—N° 1222.

FORDYCE, Alexander.—" The art of making a salt commonly " called by chymists Glauber salts, or the sal mirabile Glauberi, " from materials cheaper or different, and by a method hitherto " unknown in His Majesty's dominions." Mixing 75 lbs. of " green vitriol which has been calcined " with 50 lbs. of decrepitated salt, and heating the mixture to cherry-red in a reverberatory furnace, it soon becomes liquid, and it is stirred. The heat being gradually increased it acquires the consistence of a paste. It is now drawn from the furnace, cooled, broken up, dissolved in water, allowed to settle, poured off into pans, when it will chrystallize. If after standing a week there is any liquor not chrystallized, it is poured off and boiled down about a third, then cooled and chrystallized. "If any of the salt is found undecom-"posed, the solution must be evaporated to dryness" and "again putt into the furnace with about half a pound of calcined "vitriol to a pound of the dried solution, and treated as at "first."

[Printed, 4*d*. No Drawings.]

A.D. 1779, May 10.—N° 1223.

SHANNON, Richard.—"A new, cheap, and very advantageous "method of making and preparing pot and pearl ashes of mate-"rials never before made use of by any person or persons whom-"soever for the like purpose, and with new furnaces of curious "structure, contrived for expiditing and facilitating the process, "and which were never before used or employed by any other "person in the like manufacture." "Take of sal arcanum "duplicatum, sal polychrestum, sal tartarum vitriolicum, sal de "duobus, sal sapientia, sal enixum, sal autefebrile, sal nitrum "vitriolicum, sal ducis stolstatia, sal catholicum, and of all or "any neutral salts and saline substances composed of vitriolic acid "and fixed alkali, sixteen parts; phlogiston, two parts; marine "salt, four parts; salt of steel, two parts; and of the calcareous "earth, two parts." These are put into seven pots in a round furnace, and ignited slowly, and "a stream or current of atmospheric "air" is forced through the "containing potts untill gradually "interupted by the materials coming into fusion." When perfectly fused, "the remaining salt is dissolved in eight times its "weight of water, and precipitate what sulphur is still combined "with the alcali by impregnating the solution with fixed air; "draw off the supernatant fluid, depurate with clean vegetable "ashes and lime," and evaporate to dryness, and calcine and ultimately fuse the salt in a furnace, "in which the fire plays "under and over the materials employed," and "cool, break, and "pack up in good casks."

Pearl ashes. Take the potashes prepared as above, dissolve in pure water, precipitate "the red ocheraus taint" by volatile alkali, further purify by an impregnation of dephlogisticated air, evaporate to dryness, and calcine and fuse the salt as above.

[Printed, 10*d*. Drawing.]

A.D. 1780, February 5.—N° 1243.

SANDERSON, Mathew.—"New process for extracting from lead glitter or blue stone, and iron ores, allum, sulphur, white and green vitriols, and from copper ores blue vitriol. Refining and separating their metallic contents by a blast furnace, and rendering their refuse useful in painting and other purposes."

The sulphurous ores and minerals are dressed from all other adhering substances. "The sulphur is then obtained by means of a furnace or oven of brick or stone," constructed "so as to admit of the flame from the fuel employed to pass quite round it with pipes or flues somewhat elevated, and bending down to an horizontal recipient or condensor, terminating with a small fuel chimney, with pipes or canals in a sloping direction from the sides." The furnace is charged with the minerals, and when closed, fire is applied below, and they are brought "nearly to an ignited state." In some cases "the process is not confined to sublimation alone, but combined with that of liquidation and distillation,placing vessels of water under the sloping pipes or canalls for the reception of the sulphur." Or "the sulphur may be procured by means of combustion in covered or arched kilns of a conical form with flues," &c. "The lead glitter or blue stone must in this case be mixed with other ores and minerals holding much less of the sulphurious matter," "charging the kiln alternately with ore and fuel." "The ustulated ores are then lixivated in several waters, purified by settling," "and the various vitroils obtained by evaporation and crystalization." "The blue vitroil" "is obtainable by the means above mentioned." "Decomposed or calcined blend being added to the residue of the above liquor, and macerated or boiled therewith," a "white or zinc vitroil is produced." The same is obtained from the desulphurated lead glitter or blue stone. "From desulphurated ferrugenous ores and other substances of that nature, vitroil of iron, known by the name of green vitroil or copperas, is formed." "The remains of the vitroilic liquor being compined with an argilacious earth, and the union of an alkaline lixivium, allum is formed. "Copper ore abounding with iron, when decomposed, bleansed, and washed, deposits a red or purplish ferruginous substance." "The same happens with iron ores, which, being calcined, produce a kind of vitroilic

" colcother." The water from the washing of copper ores when treated with "absorbent or calcarious earths," &c., "precipitate " the dissolved copper, which by a careful conducted process pro- " duces pigments, blue or green." valuable for painting, &c. Clear iron put into the above solution, "copper nearly pure is " obtained," which is washed, &c., and dissolved in vegetable or mineral acids, "the productions are blue or Roman vitroil, ver- " diter, verdigrease, and other valuable pigments." "The water" from which the copper is precipitated by iron, on "exposure to air, " lets fall a yellow powder, known by the name of ochre."

For the production of metals, see Abridgements, Metals and Alloys, p. 23.

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 6th Report, p. 165.]

A.D. 1780. March 4.—N° 1246.

KING, James.—"A material called the new-invented British " barillia, for the making and manufacturing of crown window " glass, broad window glass, and glass bottles, and also for the " manufacturing of soap and allum, to much greater advan- " tage than any other material hitherto used in the manufac- " turing of those commodities." The "ashes obtained from " burning the loppings or branches of ashwood, oak, beech, " elm, alder, and any other kind of greenwood and bramble." and also "the ashes obtained from burning the green vegetables " known by the names of fearn, brecon, bean and pea straw, and " whin ashes, also common, field, and highway thistle, the stalks " of rape seed and mustard seed, and the bent or rushes that " grow by the sea shore" "being sifted through a fine sieve, are " laid down upon a boarded floor and thereto added a quantity of " soapers' waste ashes" in certain proportions and well mixed, the whole is put into an iron pan mixed with a sufficient quantity of sea water, and stirred, a fire being kept burning for a long time, " keeping the pan supplied with sea water," when it is of sufficient strength, it is calcined " in a reverberating furnace," and "kept " in fusion for the space of an hour, in which time the volatile " part flies off, and leaves remaining a fixed alkaline salt," " British borillia" having "the appearance of Spanish barillia."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 1, p. 89.]

A.D. 1780, March 30.—N° 1250. (* *)

MITCHELL, John. — "New-invented method of rectifying " spent lees from which soap has been made, and rendering the

“ same of a quality to make soap again.” “Burn the spent lees “ with helm, straw, or some other vegetable or inflammable “ matter, in the usual manner for making common pottash, with “ or without an additional alkaline; or otherwise boil such spent “ lees, with or without an additional alkaline and calcine of flux. “ The salt so obtained by either process, it will rectify the “ spent lees to be of a soap making utility.” “When the spent “ lees are rectified by burning, with or without an additional “ alkaline salt, let the saline substance, in general termed potash, “ be prepared with lime in the usual manner, as is custo- “ mary for preparing common potash or barilla ash for soap “ making.”

[Printed, 4*d*. Rolls Chapel Reports, 6th Report, p. 165.]

A.D. 1781, February 26.—N° 1281.

TURNER, James.—“ A method of producing a yellow colour for “ painting in oyl or water, making white lead, and of separating “ the mineral alkali from common salt, all to be performed in “ one single process, which would be of great publick utility.” Lead is calcined “ or minium, or red lead, or litharge,” or “ any “ preparation of lead fit for the purpose ” is mixed with half its weight of sea salt or such like salt dissolved in “ a sufficient quan- “ tity of water,” and triturated together, after twenty-four hours “ the lead will be changed to a good white, and the salt decom- “ pounded; if not, the trituration must be repeated with the further “ addition of salt, till the white colour be obtained. The decom- “ position of the salt may also be brought about by digestion or “ by calcination.” The alkali is separated by water. “ The yellow “ colour is produced by calcining the lead,” and is “ of different “ tints according to the continuance of the calcination, or the “ degree of heat employed.”

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 12, p. 157. Engineers' and Mechanics' Encyclopædia, vol. 2, p. 59. Webster's Reports, vol. 1, pp. 77 and 84. Webster's Patent Law; pp. 45, 87, and 115 (also page 126, case 21). Carpmael's Reports on Patent Cases, vol. 1, p. 105. Davis on Patents, p. 145. Collier's Law of Patents, pages 101 and 132. Billing on Patents, pages 97 and 99. Parliamentary Report, 1829 (*Patent Law*) p. 186. Durnford and East's Term Reports, vol. 1, p. 602. Patentee's Manual, p. 85. Rolls Chapel Reports, 6th Report, p. 141.]

A.D. 1781, April 30.—N° 1291.

DUNDONALD, Archibald, Earl of.—“ A method of ex- “ tracting or making tar, pitch, essential oils, volatile alkali, "mineral acids, salts, and cinders from pit coal." Coal is distilled by igniting it in ovens which have a passage or passages for the admission of air. The coals may be alone or mixed with "lime-" stone, flints, iron ore, bricks, or any other substance, by which "means the said coals being kindled are enabled by their own "heat, and without any other fire" to throw off in vapour the above matters. The condensation is promoted by commixing the vapour "with the steam of boiling water, and compleat the con-" densation by means of cold water, either in contact with the "vapour or applied externally to the vessells through which it "passes." No process is given for separating the above substances from each other.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 1, p. 145. Engineers' and Mechanics' Encyclopædia, vol. 2, p. 762. Rolls Chapel Reports, 6th Report, p. 165. Extended by Act of Parliament for 20 years (see No. 1291*).]

A.D. 1781, July 31.—N° 1302.

HIGGINS, Bryan.—"An art of extracting or producing "mineral alkali and fixed vegetable alkali." Sea water or any water containing sea salt is evaporated "until four parts of the "saline liquor contain one part or thereabout" of salt, then add oil of vitriol in certain proportions. This mixture is introduced into a reverberatory furnace, and evaporated with stirring to dryness, briskly, and heated almost to redness. "Then rake it out, you have exsiccated Glauber's salt." The charge may be made with sea salt, rock salt, &c., and with water and oil of vitriol, or "unconcentrated vitriolic acid," or "diluted vitriolic acid."

Glauber's salt is also made with the above materials, in a reverberatory furnace the dome of which communicates "by lateral "openings or tubes with water, so placed that the said tubes may "convey into the water all the acid vapour (marine acid) or matter "as fast as it issues from the charge put into the said bason" of the furnace. Dry Glauber's salt is mixed in certain proportions with charcoal, or in place of charcoal with peat, sea coal, or a vegetable matter, and heated in a reverberatory furnace "until the ignited mass melts and forms mineral alkaline liver "of sulphur." This substance may also be made in the pots and furnaces of brass and glass makers. When the "liver of "sulphur" is red hot in the furnace or vessel, lead in certain proportions is thrown in, and when it is melted they are well raked together, until the mineral alkali thus desulphurated floats distinctly over the sulphurated lead. Sometimes whilst the alkali "is in fusion, a small quantity of any calx of lead" is added to assist in extracting the "superfluous phlogistic or inflamable "matter." In place of lead other metals may be used, as iron and tin. This "mineral alkali" is "applicable to divers uses to "which barilla has been applied."

"Another method of separating the sulphur" from the "liver "of sulphur" is to mix with a strong solution of the liver of sulphur "as much argol as will dissolve therein," and to this solution add so much powdered chalk. Separate the liquor "by "subsidence and filtration," and evaporate it to dryness, and calcine the dry mass until "it becomes a grey pungent alkaline "mass or heap," "chiefly mineral alkali," named "British "barilla." In place of chalk other calcareous bodies powdered may be used, and in place of argol "tartar, crystals of tartar, lees "and dregs of old wine, or of any aged, fermented, vinous liquor, "or vinegar, or acetous acid of any kind, or any sour vegetable "dregs, juice, salt, or substance" may be used.

The furnaces employed in producing the above salts are particularly described.

[Printed, 4*d*. No Drawings. Rolls Chapel Report, 6th Report, p. 141.]

A.D. 1781, August 1.—N° 1303.

FORDYCE, ALEXANDER.—"New invented processes by which "the alkalis contained in sea salt, salt water, rock salt, salt springs, "salt cake, glauber salt, and vitriolated tartar are separated from "the marine and vitriolic acid. Mix all or any of the above mentioned salts with "double the quantity of lime, or any other "proportion," put them where they are protected from rain, let them stand "till part or the whole" "is decomposed; dissolve "out the alkali, and chrystallize it or evaporate it to dryness." Instead of lime "chalk, or any other calcareous earth, or iron, or "anything containing iron" may he used." Or "Glauber salt, "salt cake, or vitriolated tartar are mixed with iron and charcoal" in proportions given, but which may be varied, and melted together, afterwards powdered and digested for twenty-four hours or more or less with water; "separate the clear solution, evaporate "it, and chrystalize the alkali, or you may use the solution, or "evaporate it to dryness; or, instead of charcoal, you may use

" any animal or vegetable inflammable substance, or coal." "Instead of the iron" "calx of iron, or any ore of iron, or anything " containing iron, or any other metal capable of destroying " sulphur" may be employed.

[Printed, 4d. No Drawings. Repertory of Arts, vol. 4, p. 313.]

A.D. 1782, January 1.—N° 1310. (* *)

CONWAY, HENRY SEYMOUR.—" A kiln and oven so contrived " that the same fire is made to serve at the same time the different " purposes of burning lime and giving heat to stills or boilers."

An oven and kiln are placed side by side, and the heat from the oven is drawn into the kiln where the lime is burned; stills or boilers are placed above both, and are heated by flues, so that the amount of heat may be regulated; the registers are made double, and atmospheric air admitted into them for the more effectual shutting out of the heat.

[Printed, 4d. No Drawings]

A.D. 1782, November 4.—N° 1341.

COLLISON, JOHN.—" A new art or method of producing or " making mineral or vegetable alkali." Glauber's salt, or a solution of the same, rock salt, sea salt, or common salt, are mixed in certain proportions with a liquor containing vitriolic acid. This mixture "is heated in an open fire, reverberatory furnace, iron pot, " or other utensil," together with a certain proportion " of some " one or more of the following substances," namely, " mortar, " sopers' ashes, clay, gypsum, loam, calcareous or other earth, " and the same quantity, more or less, according to their different " qualities, of horns, hoofs, hair, leather straps, pitch, tar, small " vegetables, breese, charcoal, pit coal, or any other substances " containing, or supposed to contain, an inflammable principle or " phlogiston, or some one or more of them, which, when properly " heated, melted, or fluxed, produce a mineral alkali." Vegetable alkali is made as above, substituting sal polychrest, vitriolated tartar, or a substance "containing vegetable alkali and vitriolic " acid" for the above salts.

[Printed, 4d. No Drawings. Rolls Chapel Reports, 6th Report, p. 167.]

A.D. 1783, May 7.—N° 1369.

GERARD, JAMES.—" A new and improved process or method " of obtaining and producing *mineral* and vegetable alkalies con-

" tained in rock salt, brine salt, salt made from sea water, salt " refined from rock salt, Glauber's salt, and vitriolated tartar, by " separating them from the marine and vitriolic acids, which in- " vention will be of considerable public utility." "Rock salt, " brine salt, salt made from sea water, salt refined from rock, or " any or all of these," are decomposed by "vitriolic acid" added in certain proportions. "To Glauber's salt thus produced, or to " vitriolated tartar," are added, in proportion given, but which may vary, "wood charcoal, fossil coal, charred or other inflam- " mable substance, and ground together into a fine powder, when " they are melted in a reverberatory or other furnace." The " liver of sulphur" thus formed is ground up with a proportion given, but which may be varied, of "animal or vegetable oils or " fats, pitch, tar, rosin, turpentine, turf, breeze, or other inflam- " mable substances, or some one or more of them," and placed on a plate in a furnace with a fire underneath, and afterwards the mass is set fire to "by a few lighted chips" or other means, and burns to a coaly or charry substance." "Upon livixation, sub- " sidence, and evaporation, a more or less pure alkaline salt, " either vegetable or mineral according to the salt employed, " whether rock salt, Glauber's salt, or vitriolated tartar," results. " The same alkaline salts may also be obtained by making a solu- " tion of the hepar sulphuris, or a lye of it with lime, and boiling " it down with one or more of the above-named inflammable sub- " stances," and treating the mass as above described.

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 6th Report, p. 166.]

A.D. 1783, May 7.—N° 1371.

HEYS, JOHN.—" A method of making ashes and lees from straw, " turf, lime, dung, dirt of the street, sopers' wast lees, potatoe " hulm, tanners' waste, bleachers' wast, and all sorts of weeds and " vegetables, for the use of soap makers, bleachers, and all others " making use of ashes and lees, which would be of publick " utility."

The above substances named are burned in "sheds open all " round to admit the air," and the ashes mixed with a certain proportion of quick-lime, and "as much water or weak lees " added as will slack the lime."

The mixture is put into vats, and water or weak lees is added and let off once or twice a day "till the lees appear not more than

" water by weight or taste." This is said to be " sufficient for " bleachers and calico printers." " If for soap makers it will be " necessary to steep the dung with soap makers' waste or salt lees " before burning." The lixivium from such " ashes may be " made into a potash." To make a pot-ash equal to that of America, take the lixivium as before described for the use of dyers, &c., and boil it down in an iron pan into salts, put the salts in a stove, it " cannot be too hot, " " the fire thrown all around, " but no draught " to come inside. The salts are kept melted for forty or fifty minutes or longer, and drawn into iron pots. If for pearl ashes the best way is to have two fires, one under and the other above the stove. To make dyers' &c. waste lees into a pot-ash, evaporate as before, and burn them on the hearth with vegetable matters, and proceed as in the first and other operations. There are three modes given " to reanimate or reinstate soap-" makers' waste or salt lees.

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 6th Report, p. 142.]

A.D. 1783, August 16.—N° 1384.

VAZIE, Robert.—" A method of using steam in aid of fire in " obtaining of salts of all kinds, and which may likewise be used " with great advantage in various other branches of chemistry." " The sea water is run " from a cistern " into a pan made of lead " or other metal, and the smoke of the furnaces is conveyed " under this pan ;" the water " passes from thence into a pan " where it is boil'd." " The sea water, as it concentrates to a " certain degree, runs " into " a sump or cistern," and is pumped into one or two cisterns, placed " above the level of the following " pans, where it remains " " till all its impurities subside." The concentrated water is then run into another pan " fixed about " two inches above the boiling pan, where it is further concen-" trated." " The steam passes from the boiling pan through an " interior cover " perforated and grooved in such a manner as to convey the condensed steam to a convenient outlet so as to prevent " its return to the boiling pan." The sea water is then run " into two other adjoining pans upon the same level, in which it " is chrystalised alternately, by means of the steam from the " boiling pan being applied thereto in manner aforesaid."

[Printed, 4*d*. No Drawings.]

A.D. 1785, July 27.—N° 1492.

WOOD, Sutton Thomas.—"Distilling, rectifying, refining, and "preparing spirits, oils, sugars and salts, and other substances "and solutions, by the power and application of steam, and "certain discoveries in the application of steam to the carrying "on and to the various purposes of trades and manufactures." This consists "in making use of steam instead of fire." Some modes of doing this are shown; in one instance a steam jacket surrounds the still; in another the vessel or still containing the liquor to be distilled surrounds a boiler. Hot plates and ovens on the above principles are described, but it is stated it is of no consequence in what shape or form the vessels, &c. may be made, "or in what manner the heat of the steam is communicated," "provided the effect is produced upon the principle aforesaid."

[Printed, 1*s*. Drawing. Carpmael's Reports on Patent Cases, vol. 1, p. 182. Rolls Chapel Report, 6th Report, p. 172.]

A.D. 1786, January 31.—N° 1527.

BELL, James.—"Making from the refuse malt wash after "distillation, commonly called spent wash, a vegetable acid or "vinegar, for the purposes of trades and manufactures." The spent wash on keeping becomes "subject to a putrid fermentation, "which is known by a thick scum with a very offensive smell." "To change this tendency and make it commence an acetous "fermentation, it is necessary to stir up the lee from the bottom "frequently, and to break and immerse the scum in the body of "the liquor" till the "scum is changed into a light mouldy "film," when stir less frequently. This process is continued "till the liquor is changed sufficiently sharp, and gains transpa"rency" but it is "accelerated by addition of oil of vitriol and "dilution with warm or cold water if the wash be originally "strong." It may be changed either in a "close cask" or open vessel. It is applied to several uses named, among which are "converting lead into ceruse or white lead," making "vitriol or "sugar of lead," "vedegrease, or ærugo of copper," or "ærugo "of iron," for "making of salt of vinegar fixed or volatile," "chrystals and extracts from perfect and imperfect metals," and for "chymical tests, uses, and experiments."

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 6th Report, p. 174.]

A.D. 1787, January 15.—Nº 1581.

FISHWICK, Richard.—"A new method of making white lead." Hitherto the ordinary way of making the above was to lay the pots containing the "vinegar or other acid liquor" upon a bed of "horse litter," suspending the lead over the pots, placing sheets of lead over the whole, and again deal boards or straw. The next bed or stratum, or as many more as were required, were formed in the same manner, and allowed to remain for some months before opening up to remove the oxide of lead formed; this invention is to substitute for horse litter spent tan, as it "will communi-"cate a more certain and equal degree of heat to the vinegar and "lead."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 3, p. 225, Rolls Chapel Reports, 6th Report, p. 178].

A.D. 1788, August 12.—Nº 1661.

BIRNIE, Samuel.—"A method of preparing and restoring the "calx of lead after being used in extracting the mineral alkali "from common salt back into pig lead by an easier and less "expensive process than any hitherto known, by which means a "very great quantity of mineral alkali may be extracted in this "country to advantage from common salt." To prepare a calx (oxide) of lead, the lead is gently calcined until "it is all or most "of it converted into a calx, the calx is then melted and the "silver and any metallic lead still in it will sink to the bottom." By repeating in this manner the calcination and melting all the lead will thus be converted into a calx, and the silver obtained at last pure; or the silver may be purified from the last portion of lead by capellation. "To restore or reduce" back again into lead the above calx, litharge, or minium, or any other calx of lead which has been used in extracting the alkali from common salt, or become in any way combined with "the marine acid," without carrying off with the acid "in the process of reduction a consider-"able portion of the metal," the following is the process:—To sixteen parts by weight of calx add one part of lime or a greater or a less proportion, "adding pit coal, charcoal, or any other con-"venient inflammable substance, and calcining all together, or "in place of lime chalk may be used, common limestone, the "shells of fish, or any other calcareous absorbent, &c. capable of "separating with heat" the marine acid from the calx of lead.

" The lime, &c. used " in the reduction will form with the marine acid a marine salt with earthy basis (chloride of calcium) obtained from the slag by lixiviation and evaporation.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 5, p. 233.]

A.D. 1789, March 11.—N° 1677.

DE BONEUIL, Anthony Bourboulon.—" An apparatus on " a new construction, and certain new-invented processes, for the " purpose of making fossil alkali, by which the many obstacles " and inconveniences attending the methods hitherto used are " remedied, and whereby that very useful and important article is " obtained of a quality equal to that abstracted from the best " barilla, which will be of the greatest consequence and advantage " to several of the manufactories carried on in this kingdom." The materials are "such as have been already used," namely, " charcoal and iron mixed and melted with Glauber salt," but " instead of keeping the mixture of the materials lying in an open " reverberatory furnace," they are kept "in pots or crucibles " made of iron, standing opon a mere flat furnace, such as is " commonly used for distillation, where their necks are raised a " little above the furnace, and their mouths closely shut with " the lids." "The empty places between each crucible are shut " on the surface of the furnace with breaks to prevent the fire " from catching the materials, as the lids are intended to prevent " them from contact of the exterior air."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 4, p. 96.]

A.D. 1789, March 25.—N° 1678.

DE BONEUIL, Anthony Bourboulon.—" Apparatus and " processes for the purpose of practising in a manner entirely new " a chymical mode of whitening every vegetable substance, such " as hemp, flax, cotton, wax, and other articles and goods manufactured of the same, in so very expeditious and extensive a " manner as to be of the greatest utility and advantage to those " trades and manufactories who deal in or use the above articles, " and unaccompanied by the inconveniences which have attended " other methods and processes heretofore made use of." This invention consists, first, in an apparatus made of glass or other suitable material for the purpose of manufacturing chlorine gas from marine acid mixed with manganese, and for collecting and condensing the gas in water. The gas is generated in a retort and allowed to bubble up into a long-necked inverted matrass full of water; as the water becomes saturated the gas depresses it and causes it to flow out of the matrass and into a receiver.

Secondly, in the mode of bleaching by means of chlorine gas. The gas is distilled as before and passed into a "lodge," in which the goods to be whitened are hung. "The gas going with the " elastic air from the retorts or bottles into the lodge applies " incessantly to the phlogiston of the enclosed goods, and leaves " them whitened."

[Printed, 10*d.* Drawing. Repertory of Arts, vol. 4, p. 155.]

A.D. 1791, May 2.—N° 1802.

MURDOCK, William.—"The art or method of making (from " the same materials and by processes entirely new) copperas, " vitroil, and different sorts of dye, or dying stuff, paints, and " colours, and also a composition for preserving the bottoms of " all kinds of vessells, and all wood required to be immersed in " water, from worms, weeds, barnacles, and every other foulness " which usually does or may adhere thereto." Take any quantity of pyrites (mundick) containing "sulphur, arsenick, and ores of " zinc," or any materials or ores containing those substances, and ignite them in a "kiln, house, oven, cone, or heap," "admitting " no more air than is sufficient" to cause them to burn; the fumes are conducted by a flue from the top into a condenser; or, take the above ores and add "one-sixth of the ores of zink," and proceed as above, the results are a fine yellow powder, varying in tint according to the quantity of ores of zinc so added to the pyrites." These are to be applied as above. The ores of arsenic and sulphur treated as above "will also produce an inferior kind " of yellow powder." "To make green vitriol or copperas," wash the above calcined ores with water, and evaporate the solution on the kiln house or by the sun to crystallization, and let it stand for a day or more "and chrystals of copperas or green vitriol will " thereby be produced."

[Printed, 4*d.* No Drawings. Repertory of Arts, vol. 9, p. 97.]

A.D. 1791, May 17.—N° 1806. (* *)

PARKER, James.—A "method of burning bricks and tiles and " calcining chalk, earth, stone, and limestone" by using peat o bog for fuel. The peat, cut into sods and dried in the sun, is to be employed alone or mixed with an equal weight of other combustibles in ordinary kilns or clamps, care being taken in charging them to leave proper air channels. For calcining chalk, &c. the peat is to be reduced to small lumps and laid in alternately with the material to be calcined; and in the same kiln bricks and tiles may also be burned.

[Printed, 4*d*. No Drawings. See Rolls Chapel Reports, 6th Report, p. 145.]

A.D. 1791, July 2.—N° 1813.

GLENNY, George.—"Obtaining from wood ashes a greatly "superior quantity of pot and pearl ashes than have hitherto "been obtained." The common ashes produced by burning wood either have a small proportion of lime sifted among them before calcining, or are "at times stirred with an iron rake or "proper instrument during the process of calcination," in either case "it will prevent them from vitrifying." "When the ashes "are calcined into a fine powder the usual method may be pur-"sued; but it is better to boil them in large vessels, especially in "frosty weather."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 2, p. 178.]

A.D. 1791, October 18.—N° 1832.

STONE, William.—"A new method of applying the heat "arising from ovens in which coke is burnt or made, to the dis-"tillation of volatile alkali, the evaporation of saline solution, "the exciccation of chrystalline, and the sublimation of sal ammo-"niac, and a variety of other purposes." "The vaulted roof of "each coke oven is pierced with three or more holes on either side "or behind, about six inches square each," iron or copper cylinders, for the matters to be acted upon, are laid horizontal over the holes "at the height of eighteen inches from the vaulted roofs," supported on arches, &c., through which the heat is conveyed, and "then allowed to rise up to a chamber in which each cylinder "is enclosed," afterwards enters into a chimney in the roof of the building. A number of chambers for the above purposes are described, constructed upon this principle.

[Printed, 4*d*. No Drawings.]

A.D. 1792, March 29.—N° 1863.

ROBINSON, James Herring.—"A considerable improvement "in the process of making of allum, whereby that article will be "produced, without injuring the quality, much cheaper than by "any mode hitherto practised." It is stated that hitherto it has been the custom of alum makers to concentrate the strong liquor from the calcined ores to a great degree, and to add the alkaline salts "dissolved in so large a quantity of water that the specific "gravity of the solution (or lies, as commonly called) is not more "than ·06 heavier than spring water, or five pennyweights, according to the customary weights of allum makers." This invention "has for its object and principal end to abolish the use "of so large a proportion of water," and "in most cases to do "wholly without any, and to make the reduction of the highly "concentrated liquor to a standard for christalizing by means of "either the strong liquor or washings which had to go into the "boilers at all events."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 4, p. 364.]

A.D. 1792, April 25.—N° 1872.

TAYLOR, Clement, and TAYLOR, George.—"A new method "of decomposing or removing all sorts of colours in linnens and "cottons, and for whitening all other kinds of linnens and cottons "in different stages of the paper manufactory." These are in reference to this subject, first making a solution of chlorine as follows:—Sixteen pounds of common salt dried, and eight pounds of manganese are ground and sifted through the finest wire sieve, incorporated together and placed in a retort or other distilling vessel, and add thereto twelve pounds of oil of vitriol, and afterwards add six pounds of cold water. The gas is distilled into a "receive or receivers capable of holding two hundred and forty "gallons, into which must be put two hundred gallons of "water." "The neck of your retort or retorts to be placed a little "above the surface of the water in the receiver or receivers" and to be closely luted. A gentle heat is applied until the ingredients become hard. It is recommended "for the sake of expedition" that the above ingredients should "be divided into four equal "parts and put in four different retorts.

Second. Making a solution by dissolving two pounds of pearlash, and adding one pound of lime previously slacked, and straining them through a flannel bag (caustic potash solution), or dissolving "two pounds of pearlash only." These solutions are employed to steep the pulp or half stuff from coloured or coarse rags before treating it with the solution of chlorine prepared as above.

[Printed, 6*d*. Drawing. Rolls Chapel Reports, 6th Report, p. 145.]

A.D. 1792, May 21.—Nº 1883.

FREARSON, DAVID.—" Certain new and improved machinery " and operations for the purpose of saving fuel in the process of " evaporating water from solutions of salts, the water or cast-off " leys of soapmakers, and which may be applicable on other occa- " sions where evaporation or a separation of water forming either " wholly or in part a dissolving fluid from the substance or sub- " stances held in solution is required." These consist, first, of covered, " receiving reservoirs for solutions required to be kept or " filtered;" " they may be constructed of various forms and materials," but tight. " If they are formed in the ground with " clay and bricks, clay, bricks, and cement, the best form will be " cylindrical; the base of the cylinder will be parallel with the " horizon."

" Second, filtration and filtering reservoirs." Another reservoir is " constructed similar to the former and adjoining thereto, over " which must be placed large square-edged bags or filterers," " into which the solutions must be pumped, or some other way " run in." Sometimes these filtering reservoirs are divided into two parts, so as to put coarse sand at the bottom of each division. These reservoirs are covered to keep out rain.

Third, " evaporating reservoirs ; " shallow pits from 9 to 14 inches deep, extending in length from east to west, or nearly so, in their length, and from north to south in their breadth.

Fourth, " the materials of which to construct the reservoirs in " general ; " consisting of clay, bricks, tiles, wood, " tarras, or " any such like good cement or mortar ; " pitch, depending upon the nature of the liquid, and likewise upon the situation of the reservoirs.

Fifth, evaporating machinery, consisting of " wheel machinery, " resembling the fly of a smoak jack, but placed vertically and its

" covers;" over the reservoirs are roofs formed of thin boards or framed canvas, &c., from which the rain may run off.

Sixth, " the moveable roofs," each about 15 feet long, with poles fixed by staples or hinges, so as to lift up the roofs and there support them.

Seventh, " wheels or flys with their axles resting towards north " and south in proper bushes on supporters rising from and " fastened to the sides of the evaporating reservoirs." To the extremities, &c. of the flys or wheels thin boards are fixed so as to form a kind of shovel to take up and disperse the solutions. These fly wheels are set in motion by the wind.

Eighth, " instead of or in addition to the above-mentioned " fly wheels," " wheels may be placed in like manner made of " thin boards, framed cloth, &c.," and these may be covered with various substances projecting out " for the purpose of dividing " and increasing the surfaces of the fluid, and must have shovels " fixed to them in the same manner as the fly wheels," &c.

Ninth, " evaporating machinery, resembling a drawbridge or " the frame machinery." These are frames which are let down and dipped into the solutions in the reservoirs for " two or three " inches, after which the frames are raised up, and the levers fixed " by means of a cord or other such contrivance " to pillars. " When " rain or dew falls the frames must be let down so as to form " roofs for the protection of the solutions." Sea water is evaporated by the above means, and " when salt is not formed or crystallized in the evaporating reservoirs by the operation of the sun " and air," the liquors are after subsidence in reservoirs to be boiled down to salt in the usual way.

[Printed, *6d.* No Drawings. Repertory of Arts, vol. 9, p. 217.]

A.D. 1792, July 5.—N° 1898.

MENISH, WILLIAM.—" An improved method or process of " making and manufacturing of sal ammoniac and glauber and " other salts for all commercial purposes." Mix together gypsum, selenite, or any other substance " composed of calcareous " earth united to vitriolic acid, either calcined or not," reduced to powder, with a solution of volatile alkali sufficient " to saturate " the vitriolic acid." After some hours of mixing, the calcareous earth falls to the bottom, and the " vitriolic ammonia may be " drawn off," and is fit for making " sal ammoniac and Glauber " salts."

[Printed, *4d.* No Drawings. *Repertory of* Arts, vol. 1, p. 303.]

A.D. 1792, August 30.—N° 1906.

HODSON, George.—"An entire new method of separating the "fosil or mineral alkali from the muriatic acid as it exists in com- "mon salt, and also in separating the fosil or mineral alkali from "the common salt as it exists in 'kelp.'" Salt and small coal or charcoal, the first preferred, are mixed together and thrown into a reverberatory furnace and stirred till brought to a proper state of fusion, when it remains an hour, and is then drawn out. This is "ash in its impure state; to refine it nothing further is "requisite than to form a lixivium and evaporate to dryness. "Kelp is treated in the same way for the mineral alkali."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 2, p. 14.]

A.D. 1792, November 28.—N° 1922.

CAMPBELL, Hector.—"An improved method of destroying "and taking away all the carbonic, oleagenous, and colouring "elements and particles in linen, cotton, hemp, and in all coloured "rags and other materials used in making paper, in a manner "hitherto unattempted in this kingdom, and at a much less cost." This consists in processes for preparing and bleaching rags for paper, one of which is for making chlorine as follows:—Into "one or more retorts or other proper vessels put therein a "substance containing oxygen or vital air, which may be found "in many substances besides manganese; but as manganese par- "ticularly abounds with oxygen, and therefore a quantity of it is "ready made by nature, take of manganese (such as contains the "most oxygen) a third part of any given quantity, and mix it "with a proportion of two-third parts of marine or sea salt; but "this proportion must be governed by the aerated state of the "manganese; mix them well together previous to their being put "into the retort," and "put in sulphuric or vitriolic acid of a "quantity equal to or rather more than the sea salt." "The "retorts should rest on sand, kept continually heated for work- "ing, or heat otherwise sufficiently communicated would do," chlorine is evolved, and in this case into a receiver, on the shelves of which the materials to be bleached are spread.

[Printed, 4*d*. No Drawing. Repertory of Arts, vol. 1, p. 156.]

A.D. 1794, October 4.—N° 2015.

DUNDONALD, Archibald, Earl of,—"A method or methods "of preparing and obtaining alum, or the salt called sulphat or

" vitrial of argil; and that in the same process, or in processes " connected therewith, I had prepared and obtained certain other " salts, saline matters, and substances, which would be of great " public utility." "Lixiviating or washing alluminious vitrialic " or pyrituous shyst or materials with sea water, or with solutions " of salts containing muriat of soda," or mixing these salts in any way with these materials for the purpose of making allum, " or the vitrial or sulphat of argil, green vitrial, or the sulphat of " iron and Epsom salts, or the vitrial or sulphat of magnesia," Glauber salt, muriatic acid, or sal ammoniac. Mixing sea salt or muriate of soda with "allum slam, mother liquor, washings of " allum, or tun liquor," heating them twice so as to drive off muriatic acid, which may be collected and combined with volatile alkali from coal tar, urine, &c. The materials lixiviated with water yield a solution of Glauber salt, which may be crystallized or evaporated to dryness.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 4, p. 1.]

A.D. 1795, February 28.—N° 2040. (* *)

BIGG, John.—" An entire new mode of " bleaching paper by " a cheap and expeditious process, in consequence of which the " colour of such paper will be so effectually fixed as not to be " affected by heat or any length of time." This consists in the use of chlorine or a solution of the same prepared as follows:—"Take of manganese eight pounds, of common sea " salt 12 pounds, or any other quantity in the same proportion, " which, being mixed together, must be well beat in a mortar." The paper, in certain proportions, is put into a receiver upon ten, twelve, or more wooden racks, and into which is fixed a proper tubulated retort, " in which first put eight ounces of the above " mixture of manganese and salt, to which add ten ounces of " vitriolic or sulphuric acid," and apply heat by a sand bath. After two hours the paper is taken out of the receiver, fresh paper is put in, and the same charge of materials is put into the retort. Another method is to " take a tub or other receiver," and " fill it with cold water, leaving a vacancy of about one-tenth of " the quantity it contains, into which introduce the neck of a " retort, the retort charged with a proportion of the aforesaid " mixture of the manganese and salt," and " then add thereto the " same proportion of vitriolic or sulphuric acid as before; the

" quantity in each retort and the number of retorts to be used " must be ruled by the quantity of liquor wanted." " The paper " is to be wet, cut, and soaked " in this liquor.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 6, p. 235.]

A.D. 1795, February 28.—N° 2043.

DUNDONALD, Archibald, Earl of.—" A method or methods " of disengaging and obtaining a mineral or fossil alkali, or soda, " and vegetable alkali, or pearl or pot ash, from neutral salts " composed of those alkalies and an acid, or from the solutions " of those salts, that in processes previous to the disengagement " of those alkalies, or in processes connected therewith, several " articles are disengaged or formed, which may be collected and " applied to several valuable purposes." " Glauber's salt or " sulphat of soda " is made by mixing with sea salt, rock salt, or muriate of soda, &c., sulphate or " sulphuret of alumine," sulphate of iron, " sulphate of magnesia or Epsom salts, or sulphuret " of magnesia, &c., " sulphat of lime or gypsum," all in solution or otherwise, and mixing with them " a due proportion of argil- " laceous earth or clay, or rather ferruginous argillaceous matter," and drying and grinding the materials and heating them " in a " reverberatory or other furnace, pot, or crucible, until the mu- " riatic acid is expelled." " The Glauber's salt or sulphat of " soda is to be separated by lixiviation and washing. It may be " crystallized or boiled to dryness," or otherwise. The earthy residue if it contains much iron may be used as a pigment. The muriatic acid expelled above may be collected, or it may be conveyed into volatile alkali " from coal tar water," &c., forming sal ammoniac. Sulphate of magnesia and muriate of soda are decomposed by heat without the addition of the ferruginous earth, but the decomposition is then " not so complete." " Sulphat of " soda " is decomposed by boiling with such a " proportion of " pearlash, potash, or vegetable alkaline salt as will combine with " the sulphuric acid " of the soda salt, crystallizing out the sulphate of potash. The soda or " mineral alkali " in solution " may " then be crystallized or boiled to dryness," and heated or not in a reverberatory or other furnace. The application of pearl ash as above is only claimed when the sulphate of soda is made as above. The muriate of potash is decomposed in the same way as the muriate of soda. Making from " sulphat of potash or vitriolated

" tartar sulphuret of potash and mild or caustic vegetable alkali." Sulphate of potash is mixed with carbonaceous matter of some kind, and brought to fusion in a furnace, and the fusion continued for some time, when it is cooled, and broken up or ground. To sulphate of soda, or a solution of same made as above, add as much of this last salt as will decompose the sulphate of soda, boil, and separate the sulphate of potash by crystallization, there remains a " carbonate of soda or mild mineral alkali, and a sulphuret of " soda," applicable for soap making. Sulphate of soda may be treated similarly to sulphate of potash as above. " Sulphuret " of potash " in solution has added to it sawdust or " any " ligneous or vegetable matter, their juices, gums, resins, or ex- " tracts or vegetable matter, such as peat," or these substances may be added first to the salt and then dissolved. The materials are *mixed out of the air*, heat applied, the liquid with washings evaporated, the sulphate of potash crystallized out; and the liquid evaporated to dryness and calcined, " will consist of mild vegetable " alkali or carbonate of potash." The next process is the same, only air *is not excluded*, the result is, more sulphate of potash, and less carbonate of potash. Another process is to add to a solution of sulphate of potash the vegetable matters, boil to dryness, calcine, wash the mass, and evaporate to dryness; the result is " mild " vegetable alkali, with a proportion of sulphat of potass." Sulphate of soda is made into sulphuret of soda (of sodium), and treated in the same way as the " sulphuret of potash." Besides the above vegetable matters, the use of the acids from fermentation or of carbonic acid for separating the sulphur are claimed. Also " disengaging the carbonic acid or fixed airs from calcareous " earth by the means of muriatic acid," or gas expelled from the muriates of potash and of soda in making them into sulphates as described above, using the gas in any way; also, " the muriat of " lime formed in the process." " The muriatic acid or muriatic " acid gas disengaged " in the above processes, " may be converted " into oxygenated muriatic acid, or oxygenated or dephlogisticated " muriatic gas, by means of manganese."

" Sulphuret of soda or potash " is decomposed by filtering it slowly through loose mould, in a vat with a cover to exclude air. The vegetable acid in the mould combines with the alkali, liberating sulphur. The filtered liquor is treated with a little lime to separate " phosphoric acid formerly contained in the mould," when boil down and calcine with vegetable matter the clear ley, to give the carbonic acid. "The process answers best when a proportion "of carbonate of soda or of potash" is mixed with the solution of the sulphuret.

"Sulphat of barytes" "when formed into a sulphuret," more especially after undergoing "one of the ligneous processes, may "be used for the decomposition" of sulphate of soda or of potash, or their sulphurets. "Carbonat of barytes is in part to be "procured by making it undergo first the hepar then the ligneous "process." The application of carbonate of barytes however obtained, and of "hepar or sulphuret of barytes," to the decomposition of sulphate of soda and of potash is claimed, also all the methods now known of decomposing sulphates of soda and of potash and their sulphurets when made as above described. Applying these salts to "peat, fossil coal," "most vegetable "matter," or for "acting on ground." Adding to any solution of muriate of soda, pearlash, potash, or vegetable alkali sufficient to combine with the muriatic acid, "then boil down the solution "and separate the salts by priority of crystallization." The disengagement of vegetable alkali in this way "is a fact well known," and this process in general is not claimed, but only the application of the alkali to the processes under this Patent.

[Printed, 6*d*. No Drawings. Repertory of Arts, vol. 7, p. 73.]

A.D. 1796, February 19.—Nº 2090.

HATELY, Joseph.—"A method of extracting and making from "vegetable bodies a new astringent acid liquid, applicable to "improvements in divers arts and manufactures." Vegetable bodies, either wood, bark, or other vegetable substance, are distilled in a retort, and the volatile matter, consisting of the acid liquid, oil, or bitumen, are collected in a receiver. The charcoal in the retorts, by admitting air, is consumed, leaving ashes which "by dissolution in water produce a fixt salt, and leave an earthy "substance." To produce the liquid "in larger quantities, and "of greater strength" than when distilling vegetable bodies in their natural state, "first saturating such wood, bark, or other "vegetable bodies in a liquor impregnated with aluminous, "nitrous, and vitriolous earths, either in their natural form or in "a purified state."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 6, p. 217.]

A.D. 1796, March 8.—N° 2094.

ATKINSON, John.—"The use and application of certain materials for making a valuable white paint or colour, and of making paint or colour from the said materials which will, in a great degree, answer the purposes of white lead."

The materials referred to above are, "a mineral calx called blind black jack or black jack, lapis caliminaris or calimine, or any other ore of zinc called or known by the name of zinc spar, or any other calx, ore, mineral, or metal reducible to zinc or from which the same may be obtained." The minerals aforesaid are calcined in a reverberatory furnace for about six hours, and from thence they are conveyed to a mill and ground by stones, and mixed "with about one-eighth part of its weight of powdered charcoal, after which it is to be removed to a furnace commonly called a close furnace or muffled furnace" provided with "an opening on each side, and dilated at the one end from the furnace by a distance of about twenty feet, but a greater or less distance may be used as the case may require." "The other end immediately joins and enters the body of the furnace. In this state the ore should be introduced through the top or crown of the said furnace, and when it is perfectly ignited or made red hot throughout a large thick white cloud or smoke with a bright blue flame will be produced, which will convey itself into the apertures or opening before mentioned and described, and will be collected in the form of a very pure white metallic calx" (oxide of zinc). It is ground with water in a "mill, conveyed into fine sieves, and received into a series of cisterns, allowed to subside, dried," and "when it is wanted in powder it should be finely ground."

[Printed, 4d. No Drawings. Repertory of Arts, vol. 8. p. 309.]

A.D. 1796, June 20.—N° 2117.

KEELING, James.—"A substitute for and a preparation that will answer any purpose for which ceruse, commonly called white lead, and minium, commonly called red lead, or calcined lead, or any other preparation of lead of the like nature, in and about the glazing and enamelling all manner of cream-coloured earthen wares, commonly called queen's ware, white earthen wares, and what are commonly called china glazed wares, and also porcelain and china wares of every kind, in the glazing

" and enameling of which ceruse or white lead, and minium or " red lead, or calcined lead, had theretofore been deemed neces- " sary and used, and which is also a substitute for the said " articles of ceruse or white lead, and minium or red lead, or " calcined or any other preparation of lead of that nature, in and " about the making of glass and enamel of every sort or kind, " and also for every purpose for which the article commonly called " glass of lead was or may be used." One method is to grind the ore of lead " with water or other liquid to a fine liquid state," and "add such quantities of the ingredients as are usually used, " and added to white and red lead in the preparation of glazes," and dip the wares into it, leaving in the burning vessel an apperture for fumes evolved in the firing to escape. An other method is to put the ore into a furnace and bring it up to a white heat, and continue the roasting or firing " for the space of an hour or two " after the vapour has visibly subsided."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 6, p. 83.]

A.D. 1796, July 20.—N° 2129.

HOAKESLY, Robert.—" A method of making British pot " ash for the use of all kinds of manufacture in which foreign " pot ash or any alkali is useful." The potash is made of " English, Scotch, Welch, or Irish kelp, foreign barilla, or salts " obtained from soap lies by evaporation, or in their calcined " state commonly called black ashes, or of soap wastes." " Any " of the above materials mixed with a certain proportion of the " salts extracted from salt lies, or by mixing in certain proportions " any two or more together." " It is also made of rock salt " mixed with a certain proportion of any foreign or other alkali." " The materials are pounded or ground into small pieces," and " thrown into an oven or furnace of a particular construction," a drawing of which is given. It appears to have a sole somewhat well-shaped, in which there is a " small hole out of which the " pot ash runs " after the materials are melted by a great heat. The furnace door is at one end, the charging door at the other, just above which is the vent to the chimney.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 8, p. 23. Rolls Chapel Reports, 6th Report, p. 191.]

A.D. 1797, February 28.—N° 2168.

HODSON, George.—" An improved method of separating the " mineral or fossile alkali from the muriatic acid as it exists in

" common salt, and also in separating the fossile or mineral " alkali from the common salt as it exists in kelp, also in separating the fossile or mineral alkali from the muriatic acid as it " exists in salt rock, common salt, brine, sea water, in the common or neutral salt of natron, sozo, sal-enixon, caput mortuum " of spirits of salt, kelp, and salts obtained from soapers' lyes." A certain quantity of lime is slacked with a strong brine until salt appears on the surface; this is spread in layers until evaporation is completed, when it is thrown into a reverberating furnace, adding a certain quantity of salt rock; the whole is then fluxed, when a certain quantity of gypsum and of "sal-enixon" are to be introduced, and the whole raked about, and at intervals of time "coal, coaks, or charcoal" in certain proportions, two spades full at a time, is thrown in and stirred well. The process is continued for three or four hours or more without any further admixture, when the charge is drawn, "and, when cold, broke up " into lumps for use." The process is varied by casting into the furnace gypsum in lumps, and after two hours of violent heating, "salt or salt rock in a shelly state" is added in certain proportions; when the whole is united a certain quantity of "charcoal " or coaks or small coal" is added, as before. "When the combustion of the coal is finished, vegetable alkali or "sal-enixon" " or "black ashes" in certain proportion is added, and, when united, charcoal in certain proportions is added as before, and the process continued and finished as above. "To obtain the " fossile or mineral alkali from the natural salt of kelp, from " soza, and caput mortuum of spirits of salt:"—These salts in lumps are thrown into the furnace with a certain quantity of gypsum or of soapers' waste; afterwards a certain quantity of charcoal is added as before, and the stirring continued. The process occupies altogether "about ten hours." "To obtain the fossile " or mineral alkali from the neutral salts of natron (soda) and sal-" enixon:"—Certain quantities of natron or of sal-enixon and of gypsum or soapers' waste are thrown into the furnace; to these are added in certain proportion black ashes, or "of salts obtained " by evaporation from soapers' lyes," and when the whole are combined, charcoal in certain proportion is added as before, and the process finished as before. To obtain "the fossile or mineral " alkali from black ashes or other salts obtained from soapers' " lyes," black ashes or uncalcined salts and "gypsum or soapers' " waste" in certain proportions are fluxed in the furnace, and charcoal in certain proportions are added as before, and the process conducted as before, and finished "in about eight hours from "the beginning of the process."

[Printed, 4*d*. Drawing. Repertory of Arts, vol. 10, p. 12.]

A.D. 1797, August 18.—N° 2189.

DUNDONALD, ARCHIBALD, EARL OF.—"A new method or "methods of making ceruse, or white lead." Lead is to be brought to a "state of calx or oxyd, the calx is to be mixed with "muirate of potash, or sal digestivus silvii, or with oxygenated "muriat of potash," or with a "solution of either of these salts" in certain proportions, well mixed and stirred at intervals, and "alternately wetted with water (either impregnated or not with "fixable air or carbonic acid)," and dried by air, or air in which carbonic acid is contained. The result is "carbonat of lead and "muriat of potash." The latter salt is washed from the carbonate, and concentrated for using as above. "The white lead is to be "ground, levigated, and dried." In this process "calx of lead "very highly calcined" is preferred. "A small portion of lead in "a metallic state" is used "along with the calx." "Muriat of "soda or sea salt" is substituted for "muriat of potash" as above, and "after the proper degree of action has taken place, a "sufficient quantity of vegetable alkaline salt is to be added." When the oxide of lead has become carbonated the salts are separated as before, and the carbonate of lead treated as before.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 8, p. 377.]

A.D. 1797, December 12.—N° 2204.

CROOKS, JOHN.—"A new method of making soap, and bleach-"ing by means and use of mineral and vegetable alkalis." The matters connected with this subject are as follows:—In making bleaching materials, either soap boilers' or bleachers' "waste lees" are put into a cask which has two bottoms, the upper one perforated with many holes, the under has only one hole; between the two bottoms is "straw mats, small pebbles, or other substances per-"vious to water." The "filtered lees" are pumped in preference into two evaporating pans, evaporated to the consistence of treacle, and run into a calcining furnace, where charcoal is added, the size of small shot, "whether made of coal, wood, peat, or other com-"bustible matter, or peat or small coal uncharred," in certain proportion;" "there is also to be thrown into the calcining furnace "new burnt marble, as hot as can be drawn from the kiln," also in certain proportion. "The evaporated lees, charcoal or other "above-mentioned fuel, and calcined marble must be thrown into "the calcining furnace altogether at one time, and frequently "stirred" are calcined into a black salt. This salt is placed in a cask as above, the hole in the lower bottom plugged up, the cask filled up with water, the whole stirred occasionally, and after sometime the plugg withdrawn; this solution is "evaporated in "one of the evaporating vessels, where it will be converted into "grey salts fit for bleaching," &c.

Calcined marble is thrown into a certain quantity of soft water, the whole covered up, and when the water is saturated with lime it is strained through a vessel as above, then saturate the lime water with "what is commonly called gas or chemical liquor."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 9, p. 73; also p. 87.]

A.D. 1798, January 23.—Nº 2209.

TENNANT, CHARLES.—"A method of using calcareous "earths, the earths strontites, and barytes, all of them either in "their carbonated or calcined states, but more properly in the "latter state, instead of alkaline substances, for neutralizing the "oxygenated muriatic acid used in bleaching, and for employing "lime, strontites, and barytes, the earths above mentioned, in the "other parts of the process of bleaching, instead of pot or pearl "ashes, kelp barylla, or other alkaline substances whatsoever." The calcareous earth is calcined to a state of quick lime, slacked with a little water, and passed through a fine wire sieve, some of this powder is "put into the receiver or vessel in use by the "bleacher for preparing his bleaching liquor, and where hitherto "a solution of alkaline salts" "has been in general use to catch "and retain the oxyginated muriatic gas." The apparatus employed is that which is now "in general use." "When the ingre- "dients put into the retort to procure this gas (whether manganese "or common muriatic acid, or manganese, common salt, and oil of "vitriol, or indeed any other materials capable of yielding it) "begin to give it out" the liquid is kept agitated, the suspended lime absorbs the acid gas, dissolving up, forming a bleaching liquor equal to that made with "the help of an alkaline lixivium."

The quantity of lime to water is given as yielding a good result, and common salt is used with the water only to assist in keeping lime suspended.

[Printed, *4d.* No Drawings. Repertory of Arts, vol. 9, pp. 303 and 308; also vol. 2 (*second series*), p. 158. Engineers' and Mechanics' Encyclopædia, vol. 1, p. 171. Webster's Reports, vol. 1, p. 125. Webster's Patent Law, p. 49 (also p. 127, case 36.) Carpmael's Reports on Patent Cases, vol. 1, p. 177. Davies on Patents, p. 429. Holroyd on Patents, p. 24. Patentee's Manual, p. 33. Billing on Patents, pp. 37, 62, and 84. Parliamentary Report, 1829 (*Patent Law*), p. 198.]

A.D. 1798, January 25.—Nº 2211.

DUNDONALD, ARCHIBALD, EARL OF.—" New methods of " manufacturing and procuring certain neutral salts, substances " and things, and of applying those and other neutral salts to " valuable purposes."

First, making sulphate of magnesia.—" Muriat of magnesia " in any form is mixed with a due proportion of sulphate of iron or of alumina, and clay added or not. The whole is dried and ground to a powder, and calcined until the muriatic acid is expelled. Iron pyrites or sulphuret of iron may be substituted for the sulphate of iron or alumina. The calcined material is lixivated, the liquor evaporated to crystallization or dryness.

Second, sulphate of magnesia is obtained by crystallizing from a solution of " allum slam;" it is however contaminated with a portion of a salt of iron, from " whence it is freed by recrystal- " lizing," with or without the use of alkaline salts " to decompose " the salts with basis of iron." Sulphate of magnesia is likewise obtained by " mixing and boiling down the liquor of the alum " works " with a due proportion of magnesia to " decompose the " sulphat of iron and alumine;" or the salts contained in the aluminous, &c. liquors may be mixed with a proportion of magnesia or lime, and calcined.

Third, making " sulphat of potash :"—" Sulphat of magnesia " or any solution containing it, " as allum slam, allum raw or boiled " liquor, bittern, or refuse salt from salt works, salt brine, muriate " of soda, (i.e.) sea salt, or sea water." These salts or their solutions are mixed with muriate of potash, or its solutions, in the proper proportions, and the liquid concentrated to crystallization. The " sulphat of potash " first crytallizes, and muriate of magnesia is in solution.

Fourth, making sulphate of potash," and " improving the " process of making alum :—Adding " to alum raw, boiled, or "boiling liquor," "muriat of potash or its solution," the liquor "properly boiled and concentrated for the crystallization of the "alum" is run off into "settlers or coolers, there to cool." "When the supernatant alum liquor has been run off," the saline matter at the bottom, "is what is commonly called slam, containing "sulphat of potash mixed with other salts."

Fifth, making sal ammoniac:—"Sulphat of ammoniac or its "solution," is mixed "with muriat of potash or its solution," on evaporating and crystallizing, sulphate of potash separates. The solution yields sal ammoniac on further evaporation, &c.

Sixth, Making "nitrate of potash or saltpetre:—Applying muriat "of potash or its solution" to "materials containing nitrate of "lime or nitrate of magnesia," lixiviating, boiling, and crystallizing.

Seventh, making "muriat of potash:"—"Soapers' salts" are calcined in a furnace to burn off organic matter, constantly stirring, but avoiding fusing the materials. The calcined materials are drawn, cooled, dissolved in water, filtered, and evaporated to crystallization, and re-crystallized.

Eighth, making "carbonate of soda, sebat of soda, phosphat of "soda, muriat of soda:"—After the separation of "the muriat of "potash above, the liquor is boiled" "to the pitch requisite for "separating by crystallization the different salts, or boil down "the salts when mixed to a dry state."

Ninth, decomposing "sebats and phosphats of soda" alone or mixed with other salts, by calcining them with sawdust or vegetable matter, stirring frequently, avoiding fusion, adding a second dose of sawdust, &c., again stirring, &c., as above; lastly, the materials are raked out, allowed to cool, lixiviated; and the solution boiled to crystallization or dryness, yields "carbonat of soda," with "more or less of the neutral salts particularly of muriat of "soda."

[Printed, *4d.* No Drawings.]

A.D. 1798, February 1.—N° 2212.

SHANNON, RICHARD.—"A new method of improving the pro- "cess of brewing, distilling, boiling, evaporating, raising, applying "and condensing steam or vapour from aqueous, spirituous sac- "charine, and saline fluids, which expedites the process, improves "the quality, and causes a great saving of time and fuel in each, "with suitable utensils, on improved principles, correspondent to

" these intentions, part of which improvements are applicable to " the utensils now in use." This consists in reference to this subject, first, in "sweetening and cleansing all the brewing, dis- " tilling, and vinegar making utensils and casks employed" by means of "steam conducted by a proper tube or pipe."

Second, the brewing coppers, stills, &c. are long cylinders which for using as evaporating pans, salt pans, pot and pearlash boilers, &c., may be double at the ends or not, and are "to be " one, two, or three, or more diameters long; that is to say, " many times longer than broad;" "under which instead of " one immense fire (as now practised) two or more are to be " placed, in all of which together not a quarter part of the fuel " now used is applied. These cylinders laying lengthways over " the fires employed to work them, the flame and smoke will " be made to pass round them in a spiral direction under and " over so as to apply every particle of heat to them and their con- " tents to be heated, that nothing but such part of the smoke as " remains unburnt can reach the chimney (placed near the centre " of the cylindric vessel), the flame and heat being deposited in its " circuit by the number of convolutions round and round the " cylinder in its passage to the chimney." The other improvements relate to mashing, brewing, distilling, & condensing.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 10, p. 17.]

A.D. 1799, April 30.—Nº 2312.

TENNANT, CHARLES.—" Invention of preparing the oxygenated " muriates of calcareous earths, strontites, barytes, and magnesia, " in a dry, undissolved, or powdery form, without suspension or " solution in water or other watery fluid, or in the state of paste, " and for applying such oxygenated muriates of the above earths " to the purposes of bleaching or removing colours from vegetable " or animal substances, by dissolving or suspending these oxy- " genated muriates, or such parts of them as are soluble or may " be suspended in water or other watery fluid, and applying the " liquor so procured to the substances to be whitened, and for " using these dry or powdery oxygenated muriates or pastes of the " above earths in other ways, for the purposes of removing colours " from the substances above mentioned." "A quantity of any " of the above-mentioned earths, or any mixture of them with " one another," are exposed "in the form of solid pieces of any " shape or of powder, or of paste made with a little water or

" other liquid," to the action of oxygenated muriatic gas," or a mixture of that gas. The gas is brought into contact with the materials " in vessels or buildings of any shape."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 13, p. 1. Engineers' and Mechanics' Encyclopædia, vol. 1, p. 171.]

A.D. 1799, May 28.—N° 2315. (* *)

BROWNE, HENRY.—" A method of making and preparing " extract of zinc." A vegetable or animal acid as common vinegar, or acid produced from vegetable or animal oil, is saturated with oxide of zinc, and the extract is thus produced. The oxide may be used in a state of ore, as calaminaris, or as blend or black jack, or flowers, or in any other state.

[Printed, 4*d*. See Repertory of Arts, vol. 16, p. 237.]

A.D. 1799, June 18.—N° 2321.

WILKINSON, JOHN.—" Discovery of a new method of making " ceruse, or white lead." Litharge is " ground very fine in sea- " water or any other saline mixture, and by repeated tritura- " tion, washing, and bleaching, white lead of the best quality " is obtained."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 11, p. 301.]

A.D. 1799, September 23.—N° 2342.

CROOKS, JOHN.—" A new method of making soap and bleach- " ing by means and use of volatile, mineral, and vegetable " alkalies, either by joining them with each other, or using the " volatile alkalies by itself, and of killing vermine, and preserving " seeds by those alkalies from birds and vermine." This invention, which relates principally to the making of different soaps, has processes for producing ammonia, which is principally to be used to " purify goods from their vegetable oils," as follows :—A boiler is covered with a lid of wood, which is lined with a thin plate of lead to prevent corrosion, " from the top of this boiler " runs a horizontal long iron pipe, to which are joined at right " angles short iron pipes, which conduct to the reservoirs in " which the green goods are to be purified." The boiler is filled with the leys made from volatile alkali, as follows :—By adding " one part of unslacked lime to eight parts of raw urine about a

" week old in summer, and two, three, or four weeks old in the " colder seasons, the two continue in the cask (of fir or iron) six " or eight hours, and the clear liquor, that is the ley, is drawn off " through a bung hole a few inches from the bottom." The steam rushes from the boiler through the long pipe, and from it through the short pipes into the purifying receivers (lined with lead) in which the goods are suspended, and are then purified, From the top of each purifier is a pipe, which passes through a vessel of cold water in a receiver in which it condenses, and from this receiver it again passes into the boiling vessel, making a continual rotation. But if soot be used, a cask is taken which has a double bottom, the upper one is perforated with small holes, and the under one has at one side of the bottom a bunghole and plug; the soot is put upon the upper false bottom, straw &c. is put between the false bottoms, the plug is shut, water is thrown on the soot, and the whole drenched for six hours, during which time the liquor passes through the soot and straw, and is drawn off, a certain amount of hot lime is added, and " this ley is used " in the combined apparatus as has been above described. In " both cases the volatile alkali may be kept apart by stopping " the passage between the condenser and the boiler, which will " detain it in the condenser." This product (ammonia) may be applied to various uses, and may be used by makers of sal-ammoniac, magnesia, sellers of hartshorn, &c. In making " fish " soft soap," " the lid of the boiler in which the fish and leys are boiled must be kept open in boiling till the particles of the " fish are torn in pieces by the leys of the potash, and the leys " of volatile alkali are added," and the lid shut and the volatile alkali coming over, which it soon does, is condensed.

The next process is to " introduce gas (chlorine?) into the " above volatile alkalies as a substitute now in use in bleaching." This is done in two ways, by either introducing " gas into the " volatile alkali leys above described " of by forming " vegetable " or mineral or grey salts, or any calcareous substance in a dry " state into a paste by means of volatile alkali," making a solution from that paste, and throwing the gas (chlorine?) into it. In using this solution in bleaching, the volatile alkali may be saved by making use of the circulating apparatus used in purifying green goods as previously described.

[Printed, 8*d*. Drawing. See Repertory of Arts, vol. 13, p. 81.]

A.D. 1800, May 10.—N° 2400.

WHITTON, John.—" A lead saccharum for the use of calico " printers, and several other useful purposes." Take " tar acid," or " wood acid, or any other empyreumatic acid, or any mixture " of them, or mixed with any other suitable acid or substance or " composition," and " dissolve therein lead or calx of lead, or " lead in any other state, or any mixture of them," and filter the solution, allow it to rest, and decant and filter again, evaporate and crystallize. This " lead saccharum " is also used for making " white lead and yellow lead," &c., for paint, &c.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 14, p. 83. Rolls Chapel Reports, 6th Report, p. 149.]

A.D. 1800, December 30.—N° 2461.

GRACE, Thomas.—" A new method of making an acid for " corroding lead, and for other purposes; and also of a new " method of preparing and making white lead, either with or " without the said acid." Substituting for " common water " the " sour water " in which any grain has been steeped in making " arch, or the wash after the distillation of spirit, sometimes also adding the water which " comes over with the oil of turpentine " when distilling the same, and dissolving therein " molasses, syrup, " or sugar " in certain proportions, and " ferment them in the " usual manner." " A large vat or back which has a false bottom " full of holes, half full of rapes or raisins from which wine has " been made," is filled up with the liquor made as above ; after twenty-four hours half the liquor is drawn off, and returned " when the rapes or raisins are sufficiently heated," and continue this " operation till a proper acid is produced, which will commonly be done in fourteen days." In corroding lead, " instead " of the usual " bed of " horse litter or tanners' bark, upon which " pots filled with acid are placed," using spent " rapes or raisins," or spent hops, " which are usually thrown " away, " either alone " or with a small quantity of horse litter or tanners' bark or " both." This method may be used with the above acid, " or " with any of the acids generally used for corroding lead."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 15, p. 15.]

A.D. 1801, June 2.—N° 2508.

HOWARD, Thomas.—" An improved method of making a " British barilla and potash, and of obtaining a greater quantity

" of alkali than hitherto discovered, by saturating with quicklime " the ashes made from bleachers' waste lie, rock salt, soda, natron, " common salt, black ashes of the soap boilers' lie, kelp or " tobacco ashes, sal enixum, caput mortuums of the vitriolic and " muriatic acids; and also for separating the vitriolic and muriatic " acids as they exist in common salt, sea water, bleachers' waste " lie, and the lie or salt of soap boilers' waste lie, these or any or " all of them together, or any other substance that in whole or " in part contains a vegetable, mineral, or fossil alkali." Take rock salt, common salt, black ashes from the soap boilers' waste lie, kelp or tobacoo ashes, or any or all of them, or of ashes "from " bleachers' waste lie, soda or natron, or any or all of them," and grind sufficiently "to pass through a fine sieve," and add a certain proportion "of cokes or cinders, charcoal, small coal, dyers' " waste wood, sawyers' dust, or any other combustible destitute " of sulphur, being first ground and sifted;" mix and spread even, and add layers of quicklime, and on each layer "sprinkle as much " common water, lie, brine, or sea water as the mass will absorb," until a certain proportion of quicklime has been added. The layers are cut down and mixed with common water, &c. until the mass "assumes the appearance of mortar;" when dried introduce them into a reverberatory furnace, and heat with stirring "for " three or four hours or more (according to quantity)" "will " produce what" is named "British barilla."

Take "sal enixum or residuum of muriatic acid" or of vitriolic acid, and add natron, black ashes of the soap boilers' waste lie, kelp, "or any other neutral salt or alkali in proportion to its " quality;" mix with vegetable matter as before in certain proportions, spread out and add quicklime, and "proceed as before," " will produce" "British barilla."

Take salts from the soap boilers' waste lie, or common salt and tobacco ashes; in "due proportion according to the salts used" mix charcoal, &c., as before. These are spread in layers, sprinkled with lie, &c., so much quicklime being added, and proceed as before " for making the British barilla."

To make pot ashes, "black ashes, salts obtained from soap " boilers' waste lie, or any other neutral salt in due proportion," " are treated in the manner before mentioned with the aforesaid " mass," this is named "British potash."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 16, p. 385. Rolls Chapel Reports, 6th Report, p. 200.]

A.D. 1801, July 1.—N° 2524.

MANLEY, James.—" Various improvements in the process of " manufacturing salt." First, " to the common apparatus for " salt-making " adding another pan, called a " preparing pan," " contiguous to the common salting pan," and heated by an extension of the flues from the said salting pan, and therefore without requiring any additional fuel; " many of the impurities " in the brine will deposit in the preparing pan." Second, " to " add to the brine a certain quantity of fixed 'alkali,' whereby " several of the earthy salts " in the brine are precipitated, and may be " removed without much difficulty." The quantity of alkali to be added must depend upon the nature, &c., of the brine.

Third, constructing the flues under the salt pans as follows:— " let flue plates be formed of plates of iron bent to an angle " lengthwise, in order to afford a face or flanch part, to be " rivetted or otherwise fastened to the bottom of the boiler, whilst " the other part of the width of the plates projects downwards " from the bottom of the pan, and is either to be received loosely " in a groove of the cross and midfeather walls , or else to hang " down for some inches beside them." By this method it is said " the flame and heated air will be kept within the flues notwith- " standing the rise and fall of the pan," which takes place " when the liquor which it contains is fully boiling."

[Printed, 6d. Drawing. Repertory of Arts, vol. 15, p. 289. Rolls Chapel Reports, 6th Report, p. 200.]

A.D. 1801, July 20.—N° 2527.

STANHOPE, Charles, Earl.—" A new manufacture of lime; " or a new process for the burning of chalk, marble, and lime " stone, or any of them into lime." The chief features of this " invention are:—1. The supply of a well-regulated draught of " air," heated to a proper degree for " making the best lime," to the exclusion of all cold air. 2. Causing the said heated air to act sufficiently upon every piece of limestone in the whole kiln, and thus, with economy of caloric, of fuel, of time, and of expense, to thoroughly burn the whole calcareous earth in the kiln. The kiln is constructed with an ash pit, and has fire brick benches that surround the fire on the four sides. The lime kiln itself is above the said benches, and has an upper and lower hatchway for the introduction and exit respectively of the limestone. The draught proceeds from the ashpit through the fire grate and fire, and through the limestone to the chimney flues. The fire bars rest on carrying bars, and have a peculiar cross section which is an elongated and uniformly curved line. The fire is fed according to a systematic plan by means of certain feeding tools that pass through " feeding-hole irons " at the top of the grate. The main walls of the kiln are carefully built with linings that have intervals between them, so as to prevent the kiln from cracking by the heat and thus admit cold air. The kiln is completely shut up during operation, the hatchways being built up and other openings being closed; a Gothic arch forms the covering of the top of the kiln. The limestone is packed in the kiln upon an arch of limestone that rests upon the benches. The kiln being charged and closed up (except the holes for feeding the fire), the limestone is heated by the hot air from the fire; the fire used at this stage is termed "the drying fire." The feeding holes are then closed up, and the real burning of the limestone takes place by means of the "ardent fire." To regulate the draught a "clinker drill," of a determinate size, is used by a man in the ashpit to suitably perforate the clinker cake only (without disturbing the fuel over it) so as to admit sufficient air without interfering with the natural position of the fuel during the burning. At the top of the flues "paving tiles" allow more or less air to pass. A great number of details respecting the construction and working of the kiln, of the materials to be used, and of the "clinker drill" to be employed in regulating the draught, are set forth. Several of the before mentioned principles and methods are said to be applicable to other processes and uses, but the benefit of these discoveries is reserved to the inventor "only" in respect to the " new manufactures of lime, above mentioned."

[Printed, 1*s*. Drawing. See Rolls Chapel Reports, 6th Report, p. 200.]

A.D. 1802, February 27,—N° 2586.

HODSON, George.—" A new or improved process or processes " for obtaining, preparing, or manufacturing the fossile or " mineral alkali from various substances." Kelp ground small with a certain quantity of " soapers' waste ashes " and " tanners' " waste bark " are mixed together and moistened with water or " soapers' spent lie " and thrown into a reverberatory furnace, at every "ten minutes the whole mass should be stirred," and a certain quantity of "tanners' waste bark and of water thrown into "the furnace," until a certain quantity of bark and water are added. "In about five or six hours the whole mass will be "fluxed" and when cold it is ready for use. "To obtain the "mineral from soza and the caput mortuums" "produced from "the use of salt rock, common salt, brine, sea water," &c., proceed "in the same way as" with kelp.

"To obtain the mineral alkali from the salt in black ashes," the black ashes are dissolved "in water or soapers' spent lie," and used in moistening a mixture of "soapers' waste ashes" and "tanners' waste bark," mixed together in certain proportions, which is thrown into the furnace, and when the solution of black ashes is expended in proceeding as above, water is added in its place. When "natron" is employed and also "salts produced "from soapers' spent lie," proceed as in the last case, but with a larger proportion of "the salts." When the other salts are employed in producing the mineral alkali, the processes are much the same, although the proportions in which the materials are mixed vary.

To improve kelp for producing mineral alkali, "intermix the "watre or sea wead with bean, pea, vitch, or any kind of straw, "together with fern, furze, broom, with any other vegetable "substances, all well dried previously to their being put into the "kiln."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 2 (*second series*), p. 161.]

A.D. 1802, March 24.—N° 2597.

ASHWORTH, JAMES.—"A new method of making iron liquor "for the use of dyers and printers." This consists, first, in dissolving "in any vegetable acid the oxyd of any metal" easily soluble" in such acid and between which metallic oxyd and acid "there is a less affinity than there is between the same acid "and the oxide of iron," adding metallic iron to the above solution which precipitates the metal before dissolved, and takes its place. As an example dissolving "red lead, litharge, white "lead, or any other oxyd of lead in vinegar brought to a boiling "heat, or nearly so" "which solution is then poured into a "vessel containing lumps or pieces of iron" and "left to stand" for "about twenty-four or thirty-six hours." "The liquor is

" then heated or boiled" with the same or fresh pieces of iron, and when cool is ready for use.

Second, dissolving "in any vegetable acid an oxyd of iron." as for instance Spanish brown, Venetian red, or ochre, &c., with vinegar, &c., brought to a boiling heat or nearly so, and when the solution has taken place it is poured on lumps or pieces of iron and after standing twenty-four or thirty-six hours the liquor is boiled as under the first head, and when cold is ready for use.

[Printed, 4*d.* No Drawings. Repertory of Arts, vol. 1 (*second series*) p. 333.]

A.D. 1802, November 30.—N° 2666.

CRAANEN, Daniel.—" Making verdigris in lumps or powder, with ingredients the produce of Great Britain."

A mixture of sal ammoniac, oil of vitriol, aqua fortis, muriatic acid, and cold spring water, all in certain proportions, are placed in a sheet of copper, turned up at the edges so as to " prevent the " mixture from running off." The mixture is " stirred every two " or three hours until the same is " of a green or bluish cast," allowed to settle, the clear liquid poured off; and the residue washed with water may be " prepared in lumps by putting the " same into moulds." These are dried " in a mild warm room." When dry " it may be ground into powder with ease or remain in " the lumps as convenient."

[Printed 4*d.* No Drawings. Repertory of Arts, vol. 4 (*second series*), p. 9.]

A.D. 1803, June 18.—N° 2714.

NEWSTEAD, Thomas.—" Method of preparing barilla and " kelp, and the neutral salts obtained therefrom."

First, " to concentrate the alkali contained in barilla and kelp," these salts are ground very small, and a small quantity at a time added to boiling water in a pan " till the water is quite saturated," " then turn the liquor over into a vat provided with sand to " filter;" fresh water about half as much as before is added to the pan and this is turned "into the vat to filter." The pan with the residue is filled up with water and boiled, and the residue is then removed as only fit for manure or glass making. This " weak lie " is saturated " with fresh barilla or kelp, and go " on as above." The filtered liquid is evaporated till a pellicle forms on the top, sulphate of potash, " feeling like sand between

" the teeth," appears first, when "boil slow, and take out the " salt as it falls to the bottom." When the pellicle tastes bitter it is "muriat of potash," the fire is then drawn, and in about ten minutes the salt at the bottom, which will still be sulphate of potash, is removed. The remaining liquor is turned into a cooler and crystallized, and several times reboiled and crystallized until " no more muriat of potash is obtained." "The remaining " (solution) is dried down, and consists of carbonate of soda, " some sulphate, and a little muriat of soda."

Second, decomposing "sulphate of potash and sulphate of soda " separated from barilla and kelp." This is effected by manipulating it in a reverberatory furnace when mixed with certain proportions of carbonaceous matter and ground chalk, "or lime " that has been sometime slacked," until " all carbonaceous " matters be consumed and the whole" in a state of fusion. This may be concentrated as with the barilla and kelp above. " Sulphate of soda is to be decomposed by the same method." When the solution is repeatedly evaporated and crystallized, the remaining liquor" will consist of sulphate and sulphite of soda, " to be dried down again and put into the furnace" as before.

Third. Sometimes muriat of potash will be found in the cooler " uncrystallized," if so, it is dissolved and crystallized. "This is " the best preparation for the alum manufacturer."

Fourth, "to separate the neutral salts contained in soap " makers' spent lie," it is filtered, boiled as in the first process to take away the sulphate of potash, and re-boiled and re-cooled to take the "muriat of potash." The residue, consisting "of " sulphate of soda and a little muriat of soda," is "to be dried " down and decomposed, as also the sulphate of potash first " separated." "To separate the neutral salts contained in salt " prepared from soap makers' spent lie," it is made "into black " ash by running it through a fusing furnace, dissolving it, and " separating "the salts" as in "the soap makers' spent lie " above."

Fifth, "to decompose sulphates of potash" and soda "contained " in soap makers' spent lie, salts prepared from their spent lie, " and black ash prepared from their spent lie or salts," the sulphates are "decomposed and concentrated as in article first and " second."

Sixth, "in applying concentrated alkalies to soap making " nothing more is wanted than to causticise them" with a given weight of quicklime; when used in bleaching they are causticised, and a lie made which is to be evaporated to a dry salt and kept close.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 4 (*second series*).]

A.D. 1803, December 31.—Nº 2746.

CROSS, Robert, and SOUTHWORTH, Thomas.—" A mode " of heating such pans, vats, cisterns, and other vessels as are " required to be heated by fire and used for working steam " engines, and in the business of a calico printer, dyer, brewer, " papermaker, bleacher, saltmaker, tanner, and other such like " trades, by which invention much expense will be saved, not " only in the fuel to be used in the heating such vessels, but also " in the constructing the vessels themselves."This consists as follows :—" Instead of applying the fire to these boilers, &c., as here- " tofore in general use under the boiler, and the flues, being on the " outside, the fire is to be put into the furnace in the inside of " the boiler and the flues also, which flues may be carried once, " twice, thrice, or more times round the inside of the boiler, and " surrounded with water." "The boilers may be made of " wood, stone, brick, cast or wrought iron, or any other material " waterproof," as may be preferred. " Soot and light ashes will " of course accumulate within the furnace and flues; but in " order to clear away such obstructions a cistern must be fixed " above the boiler to hold as much water as to fill the boiler " when cleaned, &c., and the water must be admitted into the " chimney and flues by a valve or inlet fixed in the cistern." Some illustrations of applying this mode to boilers, &c. are given.

[Printed, 8*d*. Drawings.]

A.D. 1804, May 14.—Nº 2758.

SAXELBYE, John Swift.—" A method of making white lead " different from the methods now practised or used, and without " the aid of horse litter or tanners' bark, or both of them." This is using " heat which is produced " " by the combustion of fuel." No description of building or apparatus is given, but it is stated that, to enable the operator to " keep the temperature at the requisite degree " " one or more thermometers " are inserted in " the room or space containing the pots, but having their scales " or graduations so placed as to indicate any changes that may

" take place in the said room or space." In the upper part of the room is a valve to let out excess of heat when the same is requisite; this valve is connected with "the arm of a float, supported by " the mercury of a large thermometer or else the arm of a pyrometrical apparatus or expansion bar, so that" "the increase of " temperature shall cause the said valve to be opened, and contrarywise diminution of temperature shall suffer the same to be " again closed." In some cases water or steam is used "as the " medium of communication through or by which the heat" is " transmitted into the said room or space containing the said " pots." Six weeks is the time specified when the pots should be taken out, and it is said that the temperature should be from 90° to 100° F. the first ten or twelve days, and that the heat should be "regularly increased about ten degrees for each " successive portion of eight days."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 6 (*second series*), p. 167. Rolls Chapel Reports, 6th Report, p. 202.]

A.D. 1804, May 18.—N° 2764.

WINSOR, Frederic Albert.—"An improved oven, stove, or " apparatus for the purpose of extracting inflammable air, oil, " pitch, tar, and acids from and reducing into coke and charcoal " all kinds of fuel, which is also applicable to various other useful " purposes." This consists of "a metal, brick, or earthen stove, " oven, retort, or vessel so constructed to reduce by means of fire " and heat all raw fuel of any kind into coke and charcoal " without any or little consumption of the fuel, by which operation the smoke being extracted from all raw fuel is thus " conducted through cold air or water into a condensator, where, " after being sufficiently cooled and purified it undergoes a " natural chemical resolution into tar, pitch, oil, acid, ammonia, " and inflammable gas or air. Thus by the above means of carbonizing raw fuel with heat instead of burning it the whole " weight is preserved and resolved into the said products." This principle of carbonization and the products therefrom are applied to various purposes. In reference to this subject "the wood or " vegetable acid or liquid may be used in manufacturing alum, " vitriol, copperas, and white lead," &c. "Ammonia, being a " powerful pungent liquid, may also be used and applied in tanning," &c. "It may also be christallized into sal ammoniac,

" camphire, &c." " Both the wood acid and coal ammonia " mixed with some of its own tar, &c. will prevent timber, &c. " from putrifying, rotting," &c., &c."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 5 (*second series*), p. 172; also vol. 3 (*third series*), p. 87.]

A.D. 1804, November 22.—N° 2793.

CLAYFIELD, William Henry. — " Certain processes for " separating the alkalis of potash and of soda from their sulphates " or vitriolic salts, and from their sulphurets or combinations " with sulphur, as in soapers' black ash and other similar com- " pounds." The sulphates are converted into sulphurets " by " the common process," that is by heating them in a reverberatory furnace with carbonaceous matters, adding more carbonaceous matters until the greater part of the sulphates are converted into sulphurets. The sulphurets still in a state of fusion have added to them a further quantity of carbonaceous matter so as to make them more pasty, and a quantity of lead in its metallic state; litharage or other oxide or calx of lead " is added, and the whole " well mixed, and kept at a very low red heat, adding more " carbonacious matter sometimes damp toward the end of the " operation." The salts are withdrawn, broked up, exposed for about ten days to the atmosphere, and lixiviated. The sulphuret of lead remains behind. The neutral salts are s6parated from the solution by crystallization, after which the alkalies may be obtained by boiling down or crystallization.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 6 (*second series*), p. 251. Rolls Chapel Reports, 6th Report, p. 202.]

A.D. 1806, February 14.—N° 2909.

MARSHALL, John, and NAYLOR, John.—" A new and im- " proved method or manner of manufacturing and making salt." " In the method now in use the salt brine " in " the pans or " boilers is in all parts " at the same respective times or periods in an equal state of heat, except that the nearest to the fire will be most heated." " This consists in varying, at short and suc- " cessive intervals, the degrees of heat which the brine receives " from the fire " by adding to the common brine pan or boiler," &c., " a condenser or cooler, or condensers or coolers, having open " communication with such pans or boilers, whereby the heated "brine may freely flow from the pans or boilers into and circulate "about the cooler or condenser;" "the salt is formed into "crystals chiefly in the cooler or condenser." "This in its prin- "ciple comprehends all other methods of graduating and regulat- "ing the heat of the brine."

[Printed, *4d*. No Drawings. Repertory of Arts, vol. 17 (*second series*), p. 1.]

A.D. 1806, April 3.—N° 2927.

KEIR, James.—"An improved method of manufacturing white "lead." "This consists in making white lead without the help "of vinegar or other vegetable acid." "Muriate or muriated "oxide of lead" is mixed with alkali or "some substance con- "taining alkali" and carbonic acid, or "some substance contain- "ing carbonic acid," with water sufficient to "facilitate their "admixture," stirring and agitating until decomposition is effected. The alkali "may be of any of the kinds distinguished "under the names vegetable, mineral, or volatile" as "potash "pearl ash, wood ash, barilla, salt of soda, natron, kelp, ammonia, "spirit or salt of hartshorn," &c. The carbonic acid may by derived from various sources.

[Printed, *4d*. No Drawings.]

A.D. 1806, June 17.—N° 2942.

PHELPS, Samuel.—"An improved method of making kelp, "barilla, or other vegetable or mineral alkali by fermentation and "other means, in addition to combustion." "Cut or collect "kali, salicorina, sea rack, or other plants or weeds which afford "the mineral alkali, or furmitary, wormwood, heath, or other plants "or weeds which afford the vegetable alkali," slightly dry the same by any cheap means, mix them with "plants or weeds, with "straw, light dung, hay," &c., and form the same into stacks, with thatch to defend from the rain, and leave to ferment, putrify, or rot, after which the mass may be burned "in the usual "manner" in an open pit, &c., with the addition of wood or other fuel which will not "render the ashes impure and unfit to "afford a good alkali." At the end the fire is raised "so as to "fuse the saline residue." Sometimes when the stacks are "very "completely rotten," the mass is exposed "to the air to dry and "become carbonated," the alkaline matter is separated by lixiviation, and is evaporated and incinerated "in the pit, kiln, or "furnace."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 11 (*second series*), p. 87. Rolls Chapel Reports, 7th Report, p. 193.]

A.D. 1806, August 1.—N° 2953.

TOMKINSON, Richard.—"An entire new machine, engine, or "instrument for making white salt, and preparing brine to make "white salt." This is a pan with a hollow iron cylinder running right down the centre and out at the other end. The middle of the pan is deeper than the sides, and the cylinder is supported so that the brine entirely surrounds it at all times. The fireplace is placed in the cylinder at one end, in the pan.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 9 (*second series*), p. 324. Rolls Chapel Reports, 7th Report, p. 194.]

A.D. 1807, January 15.—N° 3001.

WYATT, Walter Henry.—(*A communication.*)—"A new dis- "covery of the means of facilitating the chemical action between "copper and several saline substances so as to produce important "improvements in the art of separating gold and silver from "copper plated or united with either of those metals, and in the "manufacturing of sulphate of copper, and in the making of "many kinds of colours for painting." This consists, first, in dissolving copper: "1. By muriatic acid obtained by any means "whatever, weakened to such a degree as to prevent loss by "volatilisation, poured upon a much larger quantity of copper "than it is able to dissolve, exposed to the action of the atmo- "spheric air," or gas, &c. "capable of affording more oxygen "than atmospheric air," "there is obtained either green, brown, "or colourless liquid muriate of copper, mixed with the green "solid insoluble submuriate or muriated oxid of copper, or only "this last in much greater quantity, according to the purpose "required and to the time thought proper to be allowed to the "said action." "2. By making the muriatic acid with muriate "of soda and sulphuric acid in a convenient apparatus, and by "treating this muriatic acid with copper in the same manner, the "same products may be obtained besides the sulphate of soda." "3. By making a compound liquid of muriate of soda, sulphuric "acid, and water in required and well-known proportions, or by

" employing the weak sulphuric acid in the raw state " in the leaden chamber, and " by treating the said compound liquid with " copper in the same manner, the same products are obtained, (1) " and the sulphate of soda." " 4. By a compound liquid of " muriate of soda, sulphate of copper and water, and copper as " above, the same products are obtained." 5. By a compound liquid of muriate of soda " acidulated sulphate of alumine " (allum), and water," or any liquid containing allum, on copper as above, the above products are obtained, and likewise a new one, " a combination of green muriated oxid of copper and alumine." " (6.) By a compound liquid of muriate of soda, sulphate of iron, " and water," or " any liquid containing the said metallic salt," acting on copper as above, the same products are obtained, and a new one, "consisting in a supercial agregation of green " muriated oxid of copper and oxid of iron."

Second. "The action of copper or of its oxids on the arsenic " or arsenous acid, and some arseniates or arsenetes, for making " that useful compound of copper and arsenic or arsenous acid " known as " Scheele's green." "The same chemical combination " between the oxid of copper and the arsenous acid can be obtained by simple affinity, or in other words by a direct or immediate attraction between the two substances." " This saves all " the sulphuric acid and all the potash wasted by the hitherto " adopted process." The colour changes with the proportion of acid, and hence a variety of shades may be obtained in arseniated greens.

Third. By exposing "copper with the solution of sulphate of " ammonia to the action of atmospheric air " two new products are obtained, "vizt., 1st., the liquid, 2dly, the solid sulphate of " ammonia and copper," so that by the same means may now be obtained " nitrate, muriates, acetates, tartrates, borates, phosphates of ammonia, and copper," and also many other analogous combinations capable of affording immediate utility. When copper and a solution of acetate of ammonia are treated as above, " the solid triple compound of oxid of copper, acetic acid, and " ammonia are obtained." The products obtained above, or modifications of the same, are made into colors for painting by processes which are described.

Fourth. " Decomposing muriate of soda, and of rendering its " acid and alkali separately useful." The chloride of sodium is decomposed as under the first head, the "sulphate of soda ob-

" tained by the different processes " is collected, and if necessary the soda, either pure or carbonated, is obtained from it by any of the well-known methods. " If in the first case the decomposition " by iron is preferred, the oxid of this metal is employed," or the sulphate of soda is converted into sulphuret by means of " heat " and charcoal," &c., and the sulphuret decomposed by a compound of copper and ammonia; the sulphuret of copper precipitates, and the ammonia is distilled off from the solution of soda. The sulphuret of copper may be employed in the manufacturing of sulphate of copper or otherwise. Or "the muriate of lime " obtained as an accidental product in several of the processes " is applied "to the decomposition of sulphate of barytes. In " order to obtain muriate of barytes, decompose this last muriate " by carbonate of ammonia and muriate of ammonia, and carbo- " nate of baytes are obtained, and the last serves for decomposing " the sulphate of soda in order to obtain its base."

[Printed, 6*d*. No Drawings. Rolls Chapel Reports, 7th Report, p. 104.]

A.D. 1807, February 20.—N° 3016.

WINSOR, Frederic Albert.—" Improved oven, stove, fur- " nace, or apparatus for the extracting of inflamable air or gas " and oil for acetous and ammonial liquors from different kinds " of fuel; for reducing such fuel into coke and charcoal; for " completely purifying such inflamable air or gas of its odour " during a state of combustion."

[No Specification enrolled.]

A.D. 1807, July 28.—N° 3065.

ASTLEY, Joseph.—" Certain improvements in the manufacture " of sal ammoniac." Muriate of magnesia or alumina, or a muriate of a metal of which "the acid is capable of being dis- " engaged by heat," the former salt is generally employed, is mixed in solution or otherwise with "such vegetable or mineral " substances as afford ammonia or volatile alkali by distillation," and the mixture, dry or otherwise is distilled, "the products of the " combustion being collected in chambers or receivers." " In all " the processes the product is the same, being muriat of ammonia " or sal ammoniac, partly dry, and partly in solution, which is

" afterwards to be crystallized and sublimed according to the " ordinary processes."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 12 (*second series*), p. 248.]

A.D. 1808, January 23.—Nº 3099.

NOBLE, Edward Moore.—" New method of making carbonate " of lead, commonly called white lead." Lead in thin plates or small pieces is partly immersed in a vessel, with a " small commu- " munication with the atmosphere," containing " so much acetous " acid or vinegar, or a solution of acetite (acetate?) of lead, or of " both :" pass into the vessel a mixture of carbonic acid or oxygen gas, or of carbonic acid gas and air, or a mixture of all three, agitating frequently. The carbonate when formed is removed from the surface. Or " lytharge, or an oxyde of lead " containing oxygen sufficient to unite with acetous acid, is nearly saturated with " either acetous acid, or a solution of acetite of lead, or both " acetous acid and acetite of lead," and carbonic acid gas, pure or mixed with air, with oxygen, or another gas, is transmitted into or upon the mixture while it is being agitated.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 13 (*second series*), p. 244. Rolls Chapel Reports, 7th Report, p. 201.]

A.D. 1808, March 3.—Nº 3113.

WINSOR, Frederick Albert.—" Certain improvements upon " his former patent oven, stove, or apparatus for carbonizing all " sorts of raw fuel and combustibles, and reducing them into " superior fuel of coke and charcoal, as well as for extracting and " saving during the said process the oil, tar, pyroligneous vege- " table acid, and ammonial coal liquors, and for extracting and " refining all the inflammable air or gas so as to deprive it of all " disagreeable colour during combustion, and rendering the gas " itself salutary for human respiration when properly diluted with " atmospheric air, and various methods of applying the above " products to useful purposes."

No Specification was enrolled, as the patentee surrendered the Letters Patent before the expiration of the term of six months allowed for enrolment, the date of the Deed of Surrender being the 31st August 1808.

[Letters Patent printed, 4*d*. Deed of Surrender printed, 4*d*.]

A.D. 1808, December 29.—N° 3187.

STEEL, William.—" An entire new machine, engine, or instru-" ment for making white salt, which will be much more useful " and advantageous to the public than any machine, engine, or instrument theretofore invented for that purpose." This consists of three separate vessels; the first has a steam-tight cover furnished with a valve, &c. for " getting out the salt, &c., and a pipe or " pipes to conduct the steam under another vessel placed upon " an air-tight frame " having divisions or partitions in the form " of flues." A weight is applied to the valve of the first vessel, causing the temperature to rise in this vessel sufficient to boil the liquid. "Instead of allowing the heated air and flame to ascend " the chimney when it reaches the other end of the pan, as is " the case in the present practice," it is conducted from under the first pan, underneath every part of a second pan, " and when " the heat is all expended, the smoke ascends a chimney situate " at the other extremity of the pan."

[Printed, 10*d*. Drawing. Rolls Chapel Reports, 7th Report, p. 202.]

A.D. 1809, January 17.—N° 3190.

BRIERLY, John.—" Setting blue lead for the purpose of cor-" roding the same into white lead." This consists of a frame with " a bed of dung or bark extending backwards to the further " wall," this is planted with pots filled with acid; over these pots is a layer of boards with holes in them corresponding to the mouths of the pots, to admit the vapour to rolls of lead standing upon them, boards are put edgewise as a support for another set of boards, the interstices between which are covered by another set of smaller boards. On these is placed another bed of dung, and the process " repeated to any practicable extent." A chimney runs through all the beds.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 15 (*second series*), p. 11. Rolls Chapel Reports, 7th Report, p. 202.]

A.D. 1809, February 7.—N° 3200.

WINSOR, Frederick Albert.—" Certain improvements upon " my former patent oven, stove, or apparatus for carbonizing all " sorts of raw fuel and combustibles, and reducing them into " superior fuel of coke and charcoal, as well as for extracting and

" saving during the same process the oil, tar, pyroligneous vege-" table acid, and ammoniacal coal liquors, and for extracting and " refining all the inflammable air or gas so as to deprive it of all " disagreeable odour during combustion and rendering the gas " itself salutary for human respiration when properly diluted with " atmospheric air, and various methods of applying the above " several products to useful purposes." These are in reference to this subject, in carbonizing coal, placing the " fires into the midst " or centre of the vessels charged with raw fuel," and " employing " the refuse coke and coal only to burn in those cylinders or iron " cones surrounded by said raw fuel." " By this mode the fires " never come into contact with the fuel to be coked and decom-" posed." " By this method one-third of a bushel of refuse coke " may generate sufficient caloric to carbonize a whole bushel of " coal so as to produce one bushel and a half of good coke again, " besides from five to six pounds oil tar, from seven to eight " pounds of strong ammoniacal liquor, and from 220 to 260 cubic " feet of pure gas." " The ammoniacal liquor may be beneficially " applied by agriculturists, dyers, chemists, manufacturers of sal " ammoniac, carbonate of ammonia, and other more costly salts " by chemical combinations." The coke, among other applications may be used for chemical purposes. The gas is passed through lime water or cream of lime. " The lower chambers, " where the tar and ammoniacal liquor collects, are without " water." " The tops of the stoves may be made in form of a " kettle, pan, or other vessel, to make water boil by the hot " smoke before it passes into the condenser, or be made service-" able for other calcining and chemical purposes."

Making " succession stoves," principally made of fire and other bricks, divided into several compartments and closed with iron covers, the fires run from one, two, three, four, or more grates through a number of flues in the midst of coal, and meet in the centre in one chimney. These compartments are charged and discharged in succession.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 18 (*second series*), p. 6; Rolls Chapel Reports, 7th Report, p. 204.]

A.D. 1809, February 13.—N° 3205.

GRELLIER, James.—" A building of a peculiar construction " for the purpose of burning coke and lime, whereby the super-" fluous heat of the fire used in burning the coke is applied to

" burn the lime, and also whereby such fire may be rendered " perpetual, which I therein denominated 'the union and per-" 'petual kiln.' " This consists as follows:—At the bottom is a common coke oven for burning coal and converting it into coke, or an oven of some other form, from this oven proceeds the usual flues. In this oven coal alone is burned or converted into coke. In connection with these flues is a kiln or building, conical or cylindrical, adapted "for burning and igniting lime, stones, or " other calcareous bodies" into lime. The flues from the coke oven may enter into the lime kiln through the bottom or floor thereof, or through the sides of the same. "The lime is supported " by an iron grating or other structure, the burned lime is to be " drawn (after the coke ovens have been discharged) through " doors or quarters made just above the said iron grating or " other structure," and where the flues communicate through the sides the burned lime is drawn out at the bottom in the same manner as is done with regard to a common lime kiln.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 15 (*second series*), p. 259. Rolls Chapel Reports, 7th Report, p. 202.]

A.D. 1809, April 19.—N° 3227,

LONDON, Phillips, the elder, and **LONDON, Phillips**, the younger.—"Certain new and improved methods or processes of " manufacturing, refining and purifying muriate of soda or com-" mon salt." The muriate of soda however produced is put into a reverberatory furnace, &c. with, if required, the necessary reagents to precipitate any impurities it may contain, and brought to fusion (the necessary reagents added) and kept so for some time: the muriate of soda is drawn off from the sedimentary matters. The common salt is afterwards recovered from the sedimentary matter " by solution and evaporation." In some instances " heat " or calcination need only be employed, " after which it may be used, or it "may be refined by the modes usually practised with " rock salt, vizt. by solution, deposition, and evaporation."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 15 (*second series*), p. 327.]

A.D. 1809, May 4.—N° 3234.

BOOKER, Nugent.—" A new plan for improving and erecting " lime kilns whereby a very considerable saving is made in fuel " and the lime most perfectly burnt in a short time, which I "denominate Grellier and Booker's lime kiln." This consists in forming lime kilns with the mouth or upper aperture much smaller and more contracted than the common kiln, surrounding the mouth with a metallic ring or other suitable facing, on this placing tightly, so as to fit close, a chimney made of cast iron or other suitable material, of a conical shape, "or contracted in the "horizontal sections thereof as it rises," making "the upper part "or apex thereof to terminate in a perforation not more than a "few inches in diameter, and occasionally affixing a pipe or tube "to the said perforation so as to increase the draught," according "to the weather, the nature of the fuel, or other circumstances." In the kilns are certain apertures for ventilation at different quarters, and in large kilns a flue or flues are made "near the "middle or centres of the same, which afford the advantage of a "central draught, as well as preventing the lime from hanging or "remaining in the kiln."

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 7th Report, p. 204.]

A.D. 1809, May 15.—N° 3236.

JOHNSON, WILLIAM.—"A new or improved process for heat"ing fluids for the purposes of art and manufactures." This invention, it is stated, is for heating fluids, and "is particularly "adapted," among other applications, for "boiling and evapora"tion in the making of sugar and salt." It consists of a deep boiler capable of bearing high-pressure steam, on which there is a safety valve loaded as required. To the top of this boiler a main pipe is fixed, having smaller pipes to convey the steam to the different receptacles, on which pipes and on the main must be fixed cocks or valves, to be regulated by a weight to govern the direction and quantity and temperature of the steam to be discharged. Beside this boiler is another boiler "(open or close at "the top according to the purpose for which it may be intended) "of dimensions required, suppose double the dimensions of "superficial content of that on the fire," and having a close receptacle of a few inches deep at the bottom for receiving the steam from the boiler, and below this again is a receptacle for the condensed steam, and to which receptacle is attached a forcing pump and pipe to return the water into the boiler again. A series of other boilers such as last described may be arranged. In apparatus experimented with, the boiler supplying the steam was divided by a diaphragm "forming two boilers in one vessel "one above the other, with distinct quantities and surfaces of "water," the lower vessel having a discharge pipe and safety valve in every way like the upper, and when preferred this plan may be adopted, and also a double vessel in the part nearest the fire, in which is linseed or other oil. The inner vessel is made of wood braced with iron with metal bottom, or made of copper or other metal.

[Printed, 6*d*. Drawing. Rolls Chapel Reports, 7th Report, p. 202.]

A.D. 1809, June 8.—N° 3239.

CRAGG, Edward and **CRAGG, William**.—"Certain new "modes or improvements in the making or preparing of salt." The pan or boiler has over it nearly its whole length, a feeding vessel which is "a little above the surface of the brine or salt "water in the pan or boiler underneath, so as to receive all the "heat that will be collected at that end of the pan or boiler where "the fires are." "From the backs of the fire-places close flues "are to be made, with divisions" "between the different flues, "and continued to the further extremity under the whole of the "boiler, with a chimney or chimnies at the further end thereof, "in which they should all meet."

[Printed, 6*d*. Drawing.]

A.D. 1810, October 8.—N° 3390.

HODSON, George.—"An improved method of separating the "alkaline salt from the acid as it exists in the following sub- "stances, vizt., kelp, black ashes, soapers' salts, spent leys, sosa, "natron, rock salt, common salt, brine, sea water, caput mor- "tuum of aqua fortis, caput mortuum of oil of vitriol, and caput "mortuum of salt used by bleachers." Kelp is ground and lixiviated with water, the saline matter is evaporated with a certain proportion of slacked lime and "of charcoal or cynders or pit coal "ground to dust" and sifted, stirring "until the lixivium begins "to rise;" as "the liquid evaporates soft water must be added "until the acid is dispersed:" "with kelp the operation is finished "in twelve or fourteen hours." After the evaporation of the acid the fire is drawn, and the mass stirred till cool. It is now fit to be used by the soap maker "by bruising it small and mix- "ing it with quick lime properly slacked." If the ash is prepared for sale it is put into a furnace, and with stirring brought to fusion, and kept so for half an hour and drawn. Another part of the process is as follows:—the kelp is ground and mixed with a certain proportion of "black peat moss or earth of moss, "made small and moistened with water," the whole put into a reverberatory furnace, raked about "until the peat moss be con"sumed, which will be in six or eight hours; it is then to be "drawn out, and is fit for use."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 20 (*second series*), p. 130.]

A.D. 1811, September 23.—N° 3492.

MAAS, Johannes Ambrosius.—"An improvement in the "making of vinegar." Vessels have two perforated "internal "disks," one near the top, the other near the bottom; between these two, raisins or whatever it may be are put, and the vessels filled up with hot water, and the whole left covered up for five or six days, when the liquid is drawn, and this repeated again. The liquors together are put into two fermenting vats, close to each other, each having a perforated "disk," "fastened (parallel to the "bottom) at fifteen inches from the top," upon which closely pressed together are "stalks of raisins up to the top of the vats;" one vat "is to be filled up to the top, and the other up to the "perforated disk." The heat is to be kept up by a stove. At the "end of every twenty-four hours," the vat which is filled to the top is emptied as far as the disc into the other vat. At "the end of "about fourteen days acidity begins to manifest itself," when spirit, in preference rather above proof, is added in certain proportions. In about three months the vinegar is placed in vats in a cool place and "clarified by any of the processis in common use." Either mix an acetous solution of isinglass with the vinegar, or fill the casks with beech wood shavings; in a few days the vinegar will be clear.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 21 (*second series*), p. 70.]

A.D. 1811, October 1.—N° 3494.

STRACHAN, William.—"New mode of making salt."

[No Specification enrolled.]

A.D. 1811, November 21.—N° 3507.

DE BERENGER, Charles Random.—“Certain means of producing a valuable oil, and also soap and barilla, and a black “colour or pigment.” The ripe ends “the plants or vegetable “known by the name of euphorbias,” of which “the euphorbia “lathyris is preferable,” are collected and pressed. “The stalks, “branches, &c.,” burnt, “produce also a kind of barilla, and to “obtain the black colour or pigment, the dregs or pulp” are “burnt in a crucible.”

See Abridgements of Specifications on Oils, &c., p. 47.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 22 (*second series*), p. 66. Register of Arts and Sciences, vol. 4, p. 421. Rolls Chapel Reports, 8th Report, p. 87.]

A.D. 1812, January 20.—N° 3519.

ZINK, Jacob.—“A new method of manufacturing verdigris, “which I denominated British verdigris.” Oxid of sulphate of “copper” is made by adding to copper cut small or granulated, in a cepper not placed in an iron aand bath, so much oil of vitriol and water, and boil to dryness, put this salt into a canvass sack, and saturate so much water by plunging it in and drawing it out of the water, and to this solution a solution of “pot ashes or “soda,” the precipitate is gathered on canvas, and washed and pressed.

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 20 (*second series*), p. 271; also, vol 27 (*second series*) p. 171. ebster's Reports, vol. 1, pages 44 and 82; Webster's Patent Law, pages 49 and 87 (also p. 128, case 52), and Supplement, p. 14; Webster's Letters Patent, pages 14 and 72; Holt's Reports (Nisi Prius), vol. 1. p. 58; Holroyd on Patents, p. 23; Carpmael's Reports on Patent Cases, vol. 1, p. 290; Billing on Patents, pages 54 and 95; Jurist, vol. 9, p. 187; Patentee's Manual, p. 57; Rolls Chapel Reports, 8th Report, p. 88.]

A.D. 1812, March 14.—N° 3547.

DUNDONALD, Archibald, Earl of.—“Method of preparing “and manufacturing alkaline salts from vegetables the growth of “the United Kingdom of Great Britain and Ireland.”

[No Specification enrolled.]

A.D. 1812, October 31.—N° 3612.

SHEFFIELD, William Evetts.—“An improved apparatus and “furnaces for separating metallic and other substances from their

" ores or whatever matters may be combined, united, or mixed " with them, and in the application of the same." These are, in reference to this subject, as follows:—One portion or part is called an air conductor, and is to be applied to or constructed in and along with a furnace or furnaces, and to be therewith used for the purpose of introducing into direct contact with the ores or other materials to be exposed to the action of heat in the said furnace or furnaces, atmospheric air or any other gas or elastic fluid which may be found or considered to be useful in or as to the treatment of the said ores or materials." In "making red " lead the air conductor should be placed in the back wall or " opposite the door or entrance of the furnace." "A furnace " for separating metallic zinc from its ore," which is applicable to other substances being sublimed or distilled, such as sulphur or arsenic, "consisting of" the chamber or vessel of a close furnace heated by fire acting under the bottom and round the sides and top thereof "when required," having "shelves or compartments, either fixed or moveable within the furnace," to " dispose and place the said ores, whether in powder or in pieces, " upon the said shelves or in the said compartments." "A " compounded furnace consisting of a number of close chambers" " heated by fire acting beneath and round the sides and top " thereof," with "conductors to convey the fumes from ores " dispersed upon the floor or shelves or in compartments into " place or places of condensation." The floors, &c. are made moveable.

[Printed, 10*d*. Drawing. Engineers' and Mechanics' Encyclopædia, vol 1, p. 576.; Rolls Chapel Reports, 8th Report, p. 94.]

A.D. 1812, December 14.—N° 3622.

SPENCER, JOHN.—" An addition to or improvement in the " setting of salt pans." This consists in " attaching to any pan " one or more boilers (in preference of cast iron) either to the " ends or sides of the pan, but the end furthest from the chimney or draft is the most proper." "The boiler increases in size " with the increase in size of the pan; in very extensive pans it " will be proper to have two or more boilers in order to divide " the fire, and which two boilers may be sufficient for pans of " very large dimensions." "The boiler should be an oblong " square, and a little wider at the top than the bottom." " Its

A.D. 1811, November 21.—N° 3507.

DE BERENGER, Charles Random.—"Certain means of pro-"ducing a valuable oil, and also soap and barilla, and a black "colour or pigment." The ripe ends "the plants or vegetable "known by the name of euphorbias," of which "the euphorbia "lathyris is preferable," are collected and pressed. "The stalks, "branches, &c.," burnt, "produce also a kind of barilla, and to "obtain the black colour or pigment, the dregs or pulp" are "burnt in a crucible."

See Abridgements of Specifications on Oils, &c., p. 47.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 22 (*second series*), p. 66. Register of Arts and Sciences, vol. 4, p. 421. Rolls Chapel Reports, 8th Report, p. 87.]

A.D. 1812, January 20.—N° 3519.

ZINK, Jacob.—"A new method of manufacturing verdigris, "which I denominated British verdigris." Oxid of sulphate of "copper" is made by adding to copper cut small or granulated, in a cepper not placed in an iron aand bath, so much oil of vitriol and water, and boil to dryness, put this salt into a canvass sack, and saturate so much water by plunging it in and drawing it out of the water, and to this solution a solution of "pot ashes or "soda," the precipitate is gathered on canvas, and washed and pressed.

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 20 (*second series*), p. 271; also. vol 27 (*second series*) p. 171. ebster's Reports, vol. 1, pages 44 and 82; Webster's Patent Law, pages 49 and 87 (also p. 128, case 52), and Supplement, p. 14; Webster's Letters Patent, pages 14 and 72; Holt's Reports (Nisi Prius), vol. 1. p. 58; Holroyd on Patents, p. 23; Carpmael's Reports on Patent Cases, vol. 1, p. 290; Billing on Patents, pages 54 and 95; Jurist, vol. 9, p. 187; Patentee's Manual, p. 57; Rolls Chapel Reports, 8th Report, p. 88.]

A.D. 1812, March 14.—N° 3547.

DUNDONALD, Archibald, Earl of.—"Method of preparing "and manufacturing alkaline salts from vegetables the growth of "the United Kingdom of Great Britain and Ireland."

[No Specification enrolled.]

A.D. 1812, October 31.—N° 3612.

SHEFFIELD, William Evetts.—"An improved apparatus and "furnaces for separating metallic and other substances from their

" ores or whatever matters may be combined, united, or mixed " with them, and in the application of the same." These are, in reference to this subject, as follows:—One portion or part is called an air conductor, and is to be applied to or constructed in and along with a furnace or furnaces, and to be therewith used for the purpose of introducing into direct contact with the ores or other materials to be exposed to the action of heat in the said furnace or furnaces, atmospheric air or any other gas or elastic fluid which may be found or considered to be useful in or as to the treatment of the said ores or materials." In "making red " lead the air conductor should be placed in the back wall or " opposite the door or entrance of the furnace." "A furnace " for separating metallic zinc from its ore," which is applicable to other substances being sublimed or distilled, such as sulphur or arsenic, "consisting of" the chamber or vessel of a close furnace heated by fire acting under the bottom and round the sides and top thereof "when required," having "shelves or com" partments, either fixed or moveable within the furnace," to " dispose and place the said ores, whether in powder or in pieces, " upon the said shelves or in the said compartments." "A " compounded furnace consisting of a number of close chambers" " heated by fire acting beneath and round the sides and top " thereof," with "conductors to convey the fumes from ores " dispersed upon the floor or shelves or in compartments into " place or places of condensation." The floors, &c. are made moveable.

[Printed, 10*d*. Drawing. Engineers' and Mechanics' Encyclopædia, vol 1, p. 576.; Rolls Chapel Reports, 8th Report, p. 94.]

A.D. 1812, December 14.—N° 3622.

SPENCER, John.—" An addition to or improvement in the " setting of salt pans." This consists in " attaching to any pan " one or more boilers (in preference of cast iron) either to the " ends or sides of the pan, but the end furthest from the chim" ney or draft is the most proper." "The boiler increases in size " with the increase in size of the pan; in very extensive pans it " will be proper to have two or more boilers in order to divide " the fire, and which two boilers may be sufficient for pans of " very large dimensions." "The boiler should be an oblong " square, and a little wider at the top than the bottom." " Its

" beer after the first brewing, for the sake of economy," or obtained by " any other means." The sheets of copper are dipped " in a solution of verdigris," and placed with the pieces of sponge in a lage stone pan " stratum super stratum," " the sponge between the sheets, not too close, as that would prevent the air " passing between them, which so much facilitates the oxydation." The sheets, from twelve to fifteen in number, are " covered over " with a slight canvas or straw covering." " The pieces of sponge " after once or twice using " are washed " in a stream," and afterwards if necessary immersed " in a tub of water weakly acidulated " with sulphuric acid," again washed, and dried, when they are used as before.

[Printed, 4*d*. No Drawings. Rep7rtory of Arts, vol. 24 (*second series*), p. 203. Rolls Chapel Reports, 8th Report, p. 96.]

A.D. 1814, February 8.—N° 3778.

VALLANCE, John, junior.—" Apparatus for the certainly " cooling brewers', vinegar makers', and distillers' worts, wash, " &c." These are so constructed as to enable the liquids employed to expose a large surface to each other, and are made by placing " bodies, or portions, or pieces of metal (they being the " best conductors of caloric) so as to cause to be between them " thin or narrow intervals." If four squares or cubes of metal are made very nearly the same size and placed within each other " there are left between them three narrow intervals," which " intervals are the mediums employed " for " the purpose of " bringing the liquids used and acted upon (water and wort) into " communication tho' not into contact, the porous nature of the " metal with respect to caloric readily affording the communication, but the closeness of its pores with respect to water and " wort, and the method of its construction, totally preventing the " contact." " In this situation, and with the middle interval filled " with hot wort, and the outer and inner ones with cold water, in the " apparatus when at work, at which time part of the heat contained " in or held by the wort is imbibed by the water, and the wort is " in consequence so reduced in temperature as in a short time to " be applicable to the further purposes of the brewing process." The wort and water are made to move " diametrically opposite, the " one moving upward and the other downward," " as owing to " the contrary motions of the two liquids the affected portions of " each are constantly meeting affected portions of the other."

Other apparatus constructed upon this principle are described, and also the manner in which the apparatus is made.

[Printed, 1s. Drawing. Rolls Chapel Reports, 8th Report, p. 103.]

A.D. 1814, July 26.—N° 3826.

JOHNSON, WILLIAM. — "A new or improved process for "making salt." This consists of a boiler which supplies steam under five vessels. The water in the boiler is saline water partly evaporated.

[Printed, 6d. Drawing. See Rolls Chapel Reports, 8th Report, p. 107.]

A.D. 1814, November 12.—N° 3853.

BENECKE, WILLIAM.—"An improved method of manufacturing verdigris, of the same quality as that known in commerce "by the name of French verdigris." In preference "a well-shorn "woollen cloth" is wetted, in preference with strong acetic acid, "distilled and highly purified," and placed between sheets of copper; "between each stratification some small pieces of wood, "or of other hard substance, are put to prevent too much pressure, "to give access to the air, and to bring the vapors of acetic acid "into contact with the bopper." After some time the verdigris is scraped or washed off and prepared in the usual way."

[Printed, 4d. No Drawings. Repertory of Arts, vol. 27 (*second series*), p. 73; Rolls Chapel Reports, 8th Report, p. 107.]

A.D. 1815, May 26.—N° 3918.

PUGH, JOHN.—"Making and altering salt pans on an improved "principle." The rims are made in the usual manner, the parts of the pan bottoms immediately over "the centre of the fires are "to be lowered and sunk about a foot more or less from the front "rim;" the lower part to be either flat or rounded. The sunk parts are of cast iron, wrought iron, copper, or other metal, or the sides may be made of one kind of metal and the bottoms of another. If cast iron or copper be used the sides and bottoms are cast separately with flanges, which are drilled for rivets to secure them together. The fore part of the pan or pans should have lids or covers, from side to side, of wood or other light materials, more or less in number according to the width of the pan. These lids or covers, extending as far as the thick parts of the pan, are "hung "by hinges on a strong rod of iron, reaching entirely across the "fore part of the pan and resting on the side rims, the front part "of the lids or covers resting upon the front rim" are drawn "up and down by means of ropes and pullies fastened to the "timbers in the pan house roof," or they may be suspended and let down upon the rims and iron rod before mentioned. A drop board of thin wood, &c. is "affixed to the back part of the lids or "covers with hinges or otherwise, so as to admit of its being "moved up or down according as it is found necessary to confine "the heat in the brine over the fires," preventing evaporation over the fires, by which a "much greater or more intense degree "of heat is caused to accumulate in the adjacent brine, which "producing a current propels the salt forward into the pan, and "prevents the deposition of it over the fires, which would soon "prove destructive to the pan bottom," and the heat more equally diffused affords larger quantities of salt and superior crystallization.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 27 (*second series*), p. 334.]

A.D. 1815, June 13.—N° 3929.

TAYLOR, JOHN.—"A mode or means of producing gas to be "used for the purpose of affording light." This is said to consist in "the exclusive right of using in any way all processes of "distilling bones or other animal matter by which an inflammable "air or olefiant gas applicable to the purposes of giving light "shall be retained and employed," "at the same time that the "usual products, namely, the bone spirit, spirit of hartshorn or "solution of subcarbonat of ammonia, and also the animal oil, "shall be properly condensed and preserved, and the bones "converted either into ivory or bone black, animal charcoal, or "into white bone ash, as may suit the views of the operator." "The vapour or gas is made to pass through a mixture of quick-"lime and water to deprive it of carbonic acid and of the fœter "of the animal oil," or through sulphuric or dilute muriatic acid, or through a series of such purifying vessels, the first containing lime and water, the following ones containing dilute acid.

An apparatus is described for obtaining gas from any kind of animal, vegetable, or mineral oil, fat, bitumen, or resin which is or can be rendered fluid by heat, but no reference is made to the obtaining thereby of any products included under this subject.

[Printed, 8*d*. Drawing. Repertory of Arts, vol. 28 (*second series*), p. 1; Engineers' and Mechanics' Encyclopædia, vol. 1, p. 595; Rolls Chapel Reports, 8th Report, p. 107.]

A.D. 1815, August 3.—N° 3946.

PELLETAN, Pierre.—"New method of making sulphuric "acid, commonly called oil of vitriol."

[No Specification enrolled.]

A.D. 1815, August 23.—N° 3954.

SAVORY, Thomas Field.—"The combination of a neutral salt "or powder, which possesses all the properties of the medicinal "spring of Seidlitz, in Germany, under the name of the seidlitz "powders."

First, "solutions are made of "subcarbonate of soda" and "supertartrate of potash," both in certain proportions, and added together, filtered, evaporated, crystallized, and redissolved and crystallized.

Second, "subcarbonate of soda is liquified by heat, and car- "bonate of ammonia added in certain proportions, and the whole "evaporated at 212° F. to dryness," and passed "through a fine "sieve."

Third, mix chalk in fine powder and supertartrate of potash together in certain proportions, and add so much boiling water; stir, and pour off the supernatant liquor, and wash the residuum repeatedly with cold water. "To the tartrate of lime thus formed," add so much dilute sulphuric acid. The solution of tartaric acid is evaporated, and the acid crystallized, and redissolved and crystallized.

[Printed, *4d.* No Drawings. Repertory of Arts, vol. 29 (*second series*) p. 14; also vol. 44 (*second series*), p. 122; Webster's Reports, vol. 1, p. 83; Webster's Patent Law, p. 88 (also page 130, case 75); Webster's Letters Patent, p. 72; Ryan and Moody's Nisi Prius Cases, vol. 1, p. 1; Carpmael's Reports on Patent Cases, vol. 1, p. 431; Parliamentary Report, 1829 (Patent Law, p. 208); Holroyd on Patents, p. 124; Billing on Patents, p. 93.]

A.D. 1816, March 18.—N° 3998.

PELLETAN, Pierre.—"New method or methods of making "sulphuric acid, commonly called oil of vitriol."

[No Specification enrolled.]

A.D. 1816, May 14.—N° 4029.

WILSON, Daniel.—"Certain new and improved apparatus's to "be employed in the distillation of animal, vegetable, and

" mineral substances, and in various other processes." These are, first, in distilling dry animal, vegetable, and mineral substances, as " coal, wood, bones, woollen rags, horns, hooves, hair, " or leather," " placing tubes, cylinders, crucibles, or retorts " made of cast iron, wrought iron, copper, or fire-clay through " the centre of a limekiln fire in such manner as to be entirely " surrounded with the ignited fuel, except at the extremities, " which are fitted with moveable covers of the same or other " materials in order that they may be charged with and emptied " of the matter to be distilled," in " order to procure coke, car- " buretted hydrogen gas, tar, ammoniacal liquor, pyroligneous " acid, or any other product of the distillation of such sub- " stances."

Second. An " apparatus for the distillation or evaporation of " liquid animal, vegetable, and mineral substances," and which may be employed with advantage to the processes of refining, brewing, distilling, dyeing, bleaching, and calico printing, and in the manufacture of bleaching salts, nitric acid, muriatic acid, sulphuric acid, alum, spirit of turpentine, soap. This consists of two vessels having a space between them, in which oil, tallow, or resinous or fatty matter is contained; a bent tube open at both ends communicates with the outer vessel, a floating guage of wood graduated to inches is contained in it, which indicates the height of the oil, &c. between the two vessels. A bent pipe carries off any vapour generated between the two vessels; it has a tap for drawing off the oil, &c. The substance to be distilled or evaporated is placed in the interior vessel.

[Printed, 8*d*. Drawing. Rolls Chapel Reports, 8th Report, p. 114.]

A.D. 1816, July 27.—N° 4046.

WARBURTON, Henry.—(*A communication.*)—" A method of " distilling certain animal, vegetable, and mineral substances, " and of manufacturing certain of the products thereof." The substances to be distilled to which this invention is applicable, are, " bone, horn, animal offal, wood, and peat, and such coal as " is capable, on being heated and submitted to distillation, of " yielding such a quantity of inflammable gas as will suffice for " the operations of this invention." The principle of the invention consists in using the gas itself produced from such substances for the purpose of heating the retorts containing the substance to be distilled. The vapour and gases which are distilled may be conducted into condensors, where the liquid or condensible portion may be collected, and the incondensible and inflammable gases may be conducted by suitable pipes directly to the retorts to be there burned or conveyed to suitable gasometers and reserved for future use. Several retorts may be fitted up and work together in such a manner that the gas from one retort in full action may be used to heat another retort; and suitable valves and registers are provided for the purpose of directing the current of gas as required. The products claimed in this invention "are the pyroligneous acid, however, distilled from wood or "peat, and the ammonia distilled from bone, horn, animal offal, "or coal." The condensed products from wood or peat may be separated one from the other by repose; the oils may be used to decompose sulphate of soda in a reverberatory furnace, and the alkali thus obtained may be used to saturate the pyroligneous acid obtained from the wood or peat.

The pyrolignate of soda obtained may be purified by filtrations and other means, and crystallized. Acetate of soda is obtained rom the pyrolignate by fusing it and then dissolving out a clear solution; or by adding to a solution of pyrolignate a suitable quantity of oxide of tin or a suitable quantity of alumina, then boiling the mixture and allowing it to subside; or by means of a suitable quantity of a salt of lead or oxide of lead, the lead being afterwards removed by some sulphuric, sulphurous, or sulphuretted compound, or by means of the action of the charcoal. Acetic acid may be obtained by adding sulphuric acid to the pure acetate of soda and distilling the mixture when great purity is required. Verdigris may be obtained by adding pyrolignate or acetate of soda to sulphate of copper in suitable proportions. The ammoniacal salt obtained from the bones, &c. may be purified by the addition of alumina.

[Printed, 10*d*. Drawing.]

A.D. 1816, August 3.—N° 4049.

HENRY, William.—"Certain improvements in the manufac"ture of sulphate of magnesia, commonly called epsom salt."

"Caustic magnesian lime is prepared by burning or calcining "magnesian limestone," then exposing it to certain acids combined with water or with certain alkaline or earthy bases. The acids used to dissolve the lime of the caustic magnesian lime, leaving undissolved the magnesia, are acetous acid or pyroligneous acid, nitric acid, muriatic acid, combined with water, or as it exists in muriate of magnesia, or "in muriate of ammonia, and the "oxymuriatic acid or chlorine." The first step in the preparation of the caustic magnesian lime is to reduce it to powder by mechanical means, or, which is preferred, adding water to the lime barely sufficient to cause it to fall into a powder, or the same effect may be produced by exposing it to the atmosphere. The powder is to be passed through a fine sieve. The patentee determines the quantity of magnesian lime necessary to saturate the acetous or pyroligneous acid employed. When mixed together they are agitated for an hour, or several hours. When that which is insoluble has fallen to the bottom, the supernatant liquor, which is acetate of lime, is decanted, and applied to any of the uses to which it is adapted. The insoluble portion, which is chiefly magnesia, is collected on linen drainers, and when dried it is calcined at a low red heat, allowing free access of air, and being frequently stirred in earthen or iron pots, or in a furnace properly constructed for the purpose. The calcined product, reduced to a powder, is diffused through water of the temperature of the atmosphere, and sulphuric acid diluted with water is added to it until it be slightly in excess. This is neutralized by successive portions of the calcined product, and afterward is added a further quantity, according to the weight of acid used, the mixture being agitated for some time: or sulphuric acid is united to the calcined product by using sulphate of iron, this being dissolved in water at or near the boiling point, the calcined product finely powdered is added to it, the materials being agitated for half an hour: or the sulphate of iron may be dissolved in water of the temperature of the atmosphere, adding to it the calcined product, the mixture being agitated at short intervals for two or more days. By any of these processes the sulphate of magnesia in solution is obtained, which clears itself by standing. After the clear liquor is considerably reduced by evaporation, it is allowed to cool, during which cooling it deposits sulphate of lime. The clear liquor remaining is transferred into another boiler, subjected to a certain degree of heat, and then is added to it carbonate of magnesia, or calcined magnesia, after which the whole is kept heated for a short time, being frequently stirred. The impurities being allowed to settle, the clear liquid is drawn off into proper vessels to be again evaporated to a sufficient density to crystallize, the product being "the sulphate of magnesia, or epsom salts."

Other salts of magnesia are prepared by processes very similar to the above, only using different acids.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 30 (*second series*), p. 142.]

A.D. 1818, January 27.—N° 4211.

HAGNER, George Frederick.—" Certain improvements in " the art of manufacturing the pigments commonly known by " the names of white lead and verdigris."

First, in making white lead, the lead is granulated by introducing it while melted into a revolving cylinder with an opening at one end,

Second, in making verdigris, using a revolving vessel " capable " of receiving an alternating motion, or of being agitated," or " fixed vessels in which agitators may be put into motion." Copper minutely divided, and pyroligneous acid, with or without water, are put into this machine and continually agitated together. If the machine is a close one, carbonic acid gas is introduced " during the operation of the machine."

[Printed, 4*d*. No Drawings. Rolls Chapel Reports, 8th Report, p. 124.]

A.D. 1818, May 19.—N° 4263.

HILLS, Thomas, and HADDOCK, Uriah.—" An improvement " in the manufacture of sulphuric acid." " In the combustion " vessel or vessels in which sulphurets or other substances in " which sulphur is contained " are introduced, are openings, " so constructed as to be kept closed or open as occasion may re- " quire " during combustion, leaving " open either wholly or in " part the aperture or apertures," so that "the atmospheric air " or other "substances containing oxygen " may assist in the combustion of the materials. " Occasionally " conveying " steam " into the condensing vessel or vessels in conjunction with atmo- " spheric air." &c.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 2 (*third series*), pp. 160, 236.; Register of Arts and Sciences, vol. 4, p. 40; Parliamentary Report, 1829 (*Patent Law*), p. 211.]

A.D. 1819, April 3.—N° 4357.

FULLER, Henry Peter.—" An improved method of producing " or preparing sulphate of soda, soda, subcarbonate of soda, and

" muriatic acid." A solution of muriate of soda is evaporated with a solution of sulphate of iron in certain proportions, and the mass exposed in a furnace until the muriatic acid is all evolved and collected. The residue is treated with water, and filtered. To the solution caustic barytes, prepared by driving off the carbonic acid from the carbonate by heat, is added, and the precipitated sulphate of barytes removed leaves pure soda in solution. If the subcarbonate of soda is required " the solution of pure soda is to " be combined with the carbonic acid expelled from the carbonate " of barytes or of lime by burning or calcining them, or by any " other method."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 36 (*second series*), p. 138; London Journal (*Newton's*), vol. 1, p. 15; Rolls Chapel Reports, 8th Report, p. 132.]

A.D. 1819, June 22.—N° 4383.

ATTWOOD, Charles.—" A mode or modes of manufacturing " mineral alkali and vegetable alkali, and the application thereof, " so far as relates to mineral alkali, by way of improvement on or " addition to other modes heretofore known or in use, but more " particularly in the manufacture of kelp." Exposing sulphurets of soda or of potash in solution or otherwise to carbonic acid gas. " The air from a flue of a furnace or kiln, or from any retort or " vessel," in calcining chalk or calcareous earth, or air from a vessel where vegetable matter is fermenting, &c., may be employed.

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 1. p. 91; Rolls Chapel Reports, 7th Report, p. 122.]

A.D. 1821, January 3.—N° 4524.

SADLER, John.—" A new and improved method or process of " manufacturing carbonate of lead, formerly denominated ceruse, " but now commonly called white lead." Introducing carbonic acid in gas or solution into a vessel, closed or otherwise, containing a solution of subacetate of lead, and agitating the whole until the " absorption of carbonic acid takes place." The carbonate of lead thus produced is " separated by decantation or filtration," and washed and dried as usual.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 44 (*second series*), p. 78 London Journal (*Newton's*), vol. 3, p. 171.]

A.D. 1821, September 8.—N° 4587.

GIBBINS, Bevington, and **WILKINSON**, Charles Hunnings.—"An improved retort or vessel for making coal and other " gas, and for the distillation, evaporation, and concentration of " acids and other substances." First, "lineing the metalic retort with Stourbridge bricks or clay, or such other like substances as " will resist the action of acids." Second, "introducing shelfs " into the retort."

[Printed, 6*d*. Drawing. London Journal (*Newton's*), vol. 3, p. 19.]

A.D. 1823, June 19.—N° 4805.

SMITH, James.—"An apparatus for the applying steam to the " boiling and concentration of solutions in general, chrystalizing " the muriat of soda from brines containing that salt, melting " and refining of tallow and oil, boiling of sugar, distilling, and " other similar purposes." An oblong boiler flat on the top, "the " top of the boiler is the bottom of the pan," it has "projecting " sides." Water "is introduced into the boiler by means of a " funnel and feed pipe;" a trap for giving vent is under this tube; another tap below this draws the water off when required, and at the other end of the boiler is a gauge cock and safety valve.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 44 (*second series*), p. 74. London Journal (*Newton's*), vol. 7, p. 190; Mechanics' Magazine, vol. 2 pp. 39 and 104; also vol. 3, p. 58; Register of Arts and Sciences, vol. 2, pp 10, 17, and 89; Engineers' and Mechanics' Encyclopædia, vol. 1, p. 212.]

A.D. 1823, July 24.—N° 4822. (* *)

TURNER, Miles, and **ANGELL**, Lawrence.—"An improved " process to be used in the bleaching of linen or cotton yarn or " cloth." This invention consists in the use and application of " alkaline sulphuret" in the process of bleaching, in substitution for potash. A ley is prepared by dissolving in water "eight Win- " chester bushels of lime, and about fifteen hundredweight of the " sulphuret," and then reducing the filtered liquor to about the same density "as the bleacher uses his potash leys." The Patentees prefer to boil the yarn or cloth first in the prepared ley, then to sour, wash, and steep in oxymuriatic acid. Then to boil again in the prepared ley, and follow up with the same kind of steeps as before, " without any exposure to the atmosphere, till a perfect " white is obtained."

[Printed, 4*d*. See Repertory of Arts, vol. 2 (*third series*), p. 25; London Journal (*Newton's*), vol. 7, p. 241.]

A.D. 1823, December 4.—N° 4876.

PARKES, JOSIAH.—“A certain method of manufacturing salt,” “Combining a boiler with a vessel or chamber attached beneath “ it, and below the action of the fire.” The boiler in preference is of the shape of “ a truncated cone inverted,” the chamber, in preference of a cylindrical shape, is joined to the bottom of the boiler, and the lower end of the chamber is “ a short inverted cone, “ to the point of which is a stop-cock.” The top of the boiler opens “into a short cylindrical box, the cover of which is move-“ able,” this serves as a man hole; pipes in it let the steam off as produced on evaporating the brine. “The safety valve also of “ the boiler is in the box.” “A vertical feed pipe communicates “ with the cylindrical vessel by means ” of two horizontal branch pipes, one entering laterally near the bottom, and the other entering “at about the line of union of the cone and dome;” each of these branch pipes is furnished with a stop-cock. The boiler and cylindrical vessel is charged with brine by turning the stop-cock of the upper feed pipe; the fire is kindled round the cone of the boiler, steam is evolved, and the particles of salt fall into the cylindrical box; when a sufficient quantity has deposited, the cock of the lower feed branch is opened, and cold brine let in “to the “ amount of about the bulk of the salt ” deposited. “ The cock “ at the bottom of the conical termination of the cylindrical “ vessel is then to be opened, upon which the salt mixed with a “ small quantity of cold brine will be expelled ” “ into a basket “ or strainer.” “The cock is to be closed until another deposit of salt shall have taken place,” when proceed as before. The boiler is supplied with guage, &c., and may be heated differently.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 1 (*third series*), p. 281; also vol. 6 (*third series*), p. 435; London Journal (*Newton's*), vol. 9, p. 247.]

A.D. 1824, January 15.—N° 4889.

LE GRAND, JEAN.—(*A communication.*)—“ Certain improve-“ ments in fermented liquors, and the various products to be “ obtained therefrom.” To give wines and vinegars not produced from grapes the qualities of those made from grapes, adding “ tartaric, citric, and oxalic acid ” in crystals or solution, separately or together, “ to all kinds of fermented worts, wash, or liquors,” “ before, during, or after the vinous or acetous fermentation,” with the design of converting “ them into vinegar ” or brandy from grapes. Mixing one or more of the above acids "with "acetic acid, or any kind of vinegar, to increase the strength of "these liquids, or to impart to them the qualities of the vinegars "obtained from grapes or fruits."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 4 (*third series*), p. 84; London Journal (*Newton's*), vol. 8, p. 135.]

A.D. 1824, June 15.—N° 4967.

JUMP, William Ainsworth, and COURT, William.—"An "improved method of manufacturing salt." This consists "in "gradually charging the salt pan with brine heated in metallic "pipes, tubes, or vessels, fixed underneath the pans in such a "manner that the brine flowing through them may be heated by "the same fires which are employed to evaporate the brine in the "pan."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 1 (*third series*), p. 68; London Journal (*Newton's*), vol. 9, p. 354; Register of Arts and Sciences, vol. 2, p. 359; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 622.]

A.D. 1824, August 5.—N° 4997.

JOHNSON, William.—"An apparatus for evaporating fluids "for the purpose of conveying heat into buildings for manu"facturing, horticultural, and domestic uses, for heating liquids "in distilling, brewing and dying, and in making sugar and "salt." This consists, first, from what is termed a multiplied boiler, consisting of three boilers placed one above the other, conveying the steam "separately or together into a close vessel or "vessels attached underneath the metal bottom of the vessel or "vessels containing the liquids to be boiled or evaporated, or "into such formed vessels placed within such liquids, or direct "into the liquids intended to be heated," returning any condensed steam to each boiler.

Second, "placing several close boilers separately over each "other within one larger boiler to be heated by the steam sur"rounding them generated from any liquid in such boiler, or "they may be immersed in such liquid."

Third, constructing vessels "one above the other to evaporate "from multiplied surfaces for all the uses before stated, by hav"ing openings for the steam to pass from the water in a lower "boiler to operate against distinct vessels formed above it, con-

" taining separate bodies of water and surfaces to evaporate from, " by which means the steam from all may be discharged by one " outer pipe."

Fourth, " employing the greater part of the steam generated in " the vessels of a multiplied boiler to act under a side pan, whilst " the remaining steam within them is employed evaporating " fluids contained in an open vessel or pan placed upon the upper " boiler for making salt (as at present effected by the steam of a " single boiler at Droitwich) or other uses."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 1 (*third series*), p. 443; London Journal (*Newton's*), vol. 10, p. 295.]

A.D. 1824, October 7.—N° 5012.

HAM, JOHN. — " An improved process of manufacturing " vinegar." This is said to be in " forming vinegar," " so that " a current or shower " of the liquid employed and " also a cur- " rent of atmospheric air can and shall be simultaneously pass- " ing over, in, or through all parts and interstices " " of birch " twigs or other materials in any direction." In the cover of a vat or cask a pump is let in, of any material not effected by acetic acid, which reaches to the bottom, and it is secured so as to be capable of rotating when worked " by hand, or by a crank, or by " any mechanical power or contrivance whatever." About one or two inches below or beneath the head or cover are one, two, or more spouts, two only are recommended, having their mouths closed; these project horizontally as far as the side of the vat or vessel and are pierced with a number of small holes. The upper part, generally the upper half of the vat, is filled nearly as high as the spouts with birch twigs laid horizontally " supported by " beams or joints and hurdles, or by a false bottom full of large " holes or by any other method which will allow a sufficient space " to contain the liquor below and a free access or current of air " through the twigs or other materials." " Just above the sur- " face of the liquor a hole is made in the side of the vat or other " vessel allowing free ingress to the atmospheric air," or " a pipe " is fixed in such hole and conducted to a bellows, air pump, or " other mechanical contrivance to extract the said air," or " the " air may be extracted from above the bed of twigs," &c.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 2 (*third series*), p. 128; also vol. 4 (*third series*), p. 358; London Journal (*Newton's*), vol. 10, p. 363; Register of Arts and Sciences, vol. 3, p. 219.]

A.D. 1824, November 11.—Nº 5034. (* *)

HEATHORN, CHARLES.—Improvements in applying the heat of coke ovens to burning lime. The lime kiln is made in the form of a circular conical chimney, and the lime rests on metal bars at the bottom, which can be drawn out so as to allow the lime to fall into a pit below, from whence it can be removed; the heat from the coke ovens is introduced into the sides at the bottom; two or more coke ovens are employed, but in every case partition walls are built up about 12 feet high, so as to confine the heat of each oven to its own side of the kiln. The lime is introduced at the top of the kiln, and numerous holes are made in the sides to allow its being stirred from time to time.

[Printed, 1*s*. Drawings. See London Journal (*Newton's*), vol. 11, p. 177; Register of Arts and Sciences, vol. 4, p. 289; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 15.]

A.D. 1824, December 4.—Nº 5046.

FURNIVAL, WILLIAM.—"Certain improvements in the manu-" facture of salt." These are, first, "in the peculiar form of sides "to a salt pan;" the sides are sunk and protected from the fire by brickwork, so that the salt deposited there is "preserved from "burning."

Second, between the lower salt pan and an upper one is a boarded steam case with "two sloping planes or roofs, in which "are" openings by which the steam rises into the chamber to the bottom of the upper pan. The steam condensed finds its way into the planes or roofs, into a pipe, and lastly into a culvert through which the brine pipe passes. A large pipe may convey the surplus steam to a third pan if required.

Third, in the lower pans are two rakes, the handles of which pass through stuffing boxes, for the purpose of raking the salt into the sunk sides of the pan.

Fourth, flues and pipes leading from the ash pits into the steam chamber, as a means of creating a draft.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 2 (*third series*), p. 323; London Journal (*Newton's*), vol. 11, p. 29; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 624.]

A.D. 1824, December 4.—Nº 5047.

YOUNG, WILLIAM WESTON.—"Certain improvements in "manufacturing salt, part of which improvements are applicable

" to other useful purposes." First, "an arrangement of iron " bars interposed between the fire used for evaporating brines, " and the pan usually called the salt pan," to " prevent the burn- " ing of the salt pans."

Second, above the lower pan is a steam flue leading to the bottom of an upper pan. "The steam arising from the brine" in the lower pan will ascend, and cause the brine in the upper pan to be evaporated, so that " double the surface of pan may be worked " under the same roof than could be worked without this con- " trivance."

[Printed, 6*d*. Drawing. London Journal (*Newton's*), vol. 11. p. 187.]

A.D. 1825, July 8.—Nº 5206.

FURNIVAL, William, and CRAIG, John.—" Certain im- " provements in the manufacturing of salt."

[No Specification enrolled.]

A.D. 1825, September 29.—5258.

DUESBURY, William.—" A mode of preparing or manufac- " turing of a white from the impure native sulphate of barytes." The native mineral is washed and ground with the addition of water, brought to boil in a pan, adding "acids or their com- " pounds," sulphuric acid preferred, sufficient to dissolve up the iron, washing repeatedly.

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 12 p. 288; Register of Arts and Sciences, vol. 4, p. 323.]

A.D. 1826, February 4.—Nº 5326.

RIGG, Robert.—" New condensing apparatus to be used with " or applied to apparatus now in use, for making vinegar."

[No Specification enrolled.]

A.D. 1826, February 11.—Nº 5327.

GAMBLE, Josias Christopher.—" Certain apparatus for the " concentration and crystallization of aluminous and other " saline and crystallizable solutions, part of which apparatus may " be applied to the general purposes of evaporation, distillation " inspissation, and dessication, and especially to the generation of " steam." The apparatus in reference to this subject consists of a vessel "wider at the mouth than the bottom" fixed on or below the ground, surrounded by a brick wall, "leaving a space for "steam," supplied by a pipe from a boiler. "A staff resting on "the centre of the bottom of the vessel, and rising above it, "having a ring on its upper end, and a larg nob at its base. The "staff is placed at the bottom of the vessel before the crystallizing "liquid is poured in." A chain is attached to the ring; "steam "is admitted round the vessel" for some minutes, so as to separate the "crystal in contact with the metallic vessel," a "crane is "turned, and the entire mass of crystals is elevated." "Where "crystals less solid than alum are made, a broad plate instead of "a knob may be attached to the staff." "For alum and many "other salts the crystallizing vessels and staff must be lined with "lead, or some other material" that will resist acids. The surrounding may be of wood or other suitable material in place of brick.

[Printed, 10*d.* Drawing. Repertory of Arts, vol. 3 (*third series*), p. 5; London Journal (*Newton's*), vol. 14, p. 130.]

A.D. 1826, February 11.—N° 5332.

WARREN, WILLIAM.—"Certain improvements in the process "of extracting from the peruvian bark medicinal substances or "properties, known by the name of quinine and cinchonine, and "preparing the various salts to which these substances may serve "as a basis."

[No Specification enrolled.]

A.D. 1826, June 13.—N° 5377.

HAM, JOHN.—"An improved process for promoting the action "of the acetic acid on metallic bodies." First, for making white lead, the chamber, "such as is at present used," is watertight "by "forming the bottom and sides to the depth of about twelve "inches of bricks laid in Roman cement." The chamber is filled to the height of three or four feet from the bottom with spent tan, or any "vegetable substance susceptible of a similar decomposition," placing thereon "flat layers of sheet lead" "arranged "alternately touching three sides of the chambers," supported by laths. The top is covered with tan. "Nearly at the height of "the surface of the lower bed of tan or other substance" a pipe of some material is inserted so as to admit a thermometer, and to admit a small supply of air. Vinegar or acetic acid is introduced by a pipe to the depth of about nine inches; a pipe coiled about the bottom of the chamber has steam passed through it "to pre-" serve the heat of the vinegar or acetic acid as nearly as possible " at 170 degrees Fahrenheit's thermometer." A small pipe communicates "with the space above the uppermost layer and the " external air," and the vapour which rises through it can at any time be tested for acetic acid. The tan when required is renewed, and the liquid is drawn off through a cock.

Second, in making vinegar, "in place of the brick or other " material mentioned" in No. 5012, substituting "shreds or " pieces of the metal intended to be acted upon," so as to promote the action of the acetic acid on metallic bodies.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 4 (*third series*), pp. 307 and 358; London Journal (*Newton's*), vol. 14, p. 90.]

A.D. 1826, July 4.—N° 5383.

GROVES, Peter.—"Certain improvements in manufacturing " or making white lead." The lead ore galena (sulphuret of lead) is reduced to a fine powder and roasted, avoiding melting it, when cold it is ground and levigated and dried again, powdered, and mixed with a certain proportion of nitrate of potash, and placed in a retort or cylinder, and screw down or cover the top. A cistern above is charged with a certain proportion of sulphuric acid of gravity from 1400 to 1740; this is forced by means of a forcing pump by a tube into the bottom of the retort or cylinder among the materials; the materials are stirred by a rod through the top, and when well mixed steam is admitted " between the outer and " inner sides of the retort or cylinder, continuing to pump in at " intervals [the acid till the whole is admitted." The steam is turned off, the whole left for some time, stirring it occasionally. The matter is taken out of the retort or cylinder, the acid which rises to the top drawn off, the matter " dried, reduced to powder, " and the operation repeated with the same quantity of saltpetre " and acid as before described." " When the lead ore is par" ticularly soft and free from other substances and well burnt, " the operation will be perfected by a single process."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 4 (*third series*), p. 429 London Journal (*Newton's*), vol. 14, p. 369.]

A.D. 1826, December 18.—N° 5431.

JOHNSON, William.—"Certain improvements in the mode " of process and form of apparatus for manufacturing salt and

" other purposes." These are, first, employing "the lower vessel " of the treble evaporating boiler" described in Nos. 4747 and 4997, "for the making of fine salt by rapid boiling under high " pressure heat in a common shallow-formed salt pan and trough " entirely enclosed from the access of the atmosphere acting on " any part of the brine."

Second, rakes "having their handles made to pass through " stuffing boxes in the side of the pan" worked by engine power, " for drawing or pushing of the salt into a trough within pans.

Third, "the employment of and the obtaining from the brine " of the fine salt a greater quantity of steam in a given time " from an entirely closed pan and trough than when not so en- " closed, and of more efficient power when raised to pressure for " passing the heat through the bottoms of the pans for the mak- " ing of broad salt in pans" (also enclosed), " whereby a proper " heat can be maintained in the brine in such pans of much greater " extent, and drawing such broad salt by steam-engine power."

Fourth, employing "the enclosed steam arising from the brine " of the broad salt," "for the manufacturing of large or British " bay salt."

Fifth, "the obtaining a greatly increased body of water from " under the broad salt pans coming from the steam of the brine " of the fine salt:" this water is employed under pans immersed in it, when placed in a frame of some kind.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 6 (*third series*), p. 89; London Journal (*Newton's*), vol. 2 (*second series*), p. 13; Register of Arts and Sciences, vol. 1 (*new series*), p. 3; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 623.]

A.D. 1827, March 2.—N° 5471.

LEDSAM, JOSEPH FREDERICK.—" Purifying coal gas." The ammoniacal liquor is saturated with muriatic acid and evaporated down till it crystallizes; to a solution of 100 lbs. of muriate so obtained is added about 50 lbs. of lime.

Through this mixture the gas to be purified is caused to pass. When the muriate of ammonia in the purifier is spent, this liquor is drawn off and saturated with muriatic acid; by subsequent evaporation and crystallization the muriate of ammonia may be recovered, together with muriate of lime. The latter is used instead of muriatic acid for converting the ammoniacal liquor into muriate of ammonia. Sulphuric acid may be used instead of muriatic acid, and magnesian lime instead of common lime, when sulphate of magnesia will result as a product.

The fetid odour of gas may be destroyed by the use, in a wet or dry state, of the "chlouret of oxide of sodium, or the chlouret "of the oxide of calcium, or chlouret of lime."

[Printed, 4*d*. Repertory of Arts, vol. 6 (*third series*), p. 312; London Journal (*Newton's*), vol. 13, pages 147 and 217; also vol. 1 (*second series*), p. 228.

A.D. 1827, April 4.—N° 5483.

TILT, JOSEPH.—(*A communication.*)—"Certain improvements in "the boilers used for making salt, commonly called salt pans, "and in the mode of applying heat to the brine." These are, forming the bottom or part of the bottom of a salt pan in such a manner (sloping from the middle towards the side), that the salt as it crystallizes falls on it, and rolls "into boxes or moulds placed "at the lower extremities of the said sides to catch the same." The pan so formed is heated by steam brought by two pipes underneath the sloped bottom of the pan, one on each side of a partition running nearly from end to end of the pan. There is "a "pipe for drawing off any condensed steam that may collect." This pan is also employed with fire in place of steam.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 6 (*third series*), p. 431; London Journal (*Newton's*), vol. 2 (*second series*), p. 283.]

A.D. 1828, June 12.—N° 5665.

STRACHAN, WILLIAM.—"My invention of and improvement "in the making or manufacturing of alum." This is "mixing "or impregnating aluminous clay, earth, or other substance "containing alumine, with the sulphate of iron" whether in solution or otherwise, and "exposing the clay, earth, or other "substance so impregnated to the action of a heat sufficient so "far to oxidize the iron as to render it insoluble, and by "means of water, dissolving, taking up, and forming the liquid "sulphate of alumine."

The sulphurets of iron are thrown upon beds and occasionally watered; the sulphurets are oxidated into sulphates, which are soluble, and which are run off into tanks.

The solution of the sulphate of alumina may be evaporated, "muriate of potash, sulphate of potash, or potash" itself added, and the whole crystallized and recrystallized until on testing there is no indication of iron by "any Prussian salt."

[Printed, *4d.* No Drawings. Repertory of Arts, vol. 8 (*third series*), p. 519; London Journal (*Newton's*), vol. 5 (*second series*), p. 266; Register of Arts and Sciences, vol. 3 (*new series*), p. 24.]

A.D. 1828, August 11.—N° 5683.

GRISENTHWAITE, William.—"A new process of making " sulphate of magnesia, commonly called Epsom salts." "Mix- " ing together magnesia, sulphate of lime" "(plastor of Paris " and gypsum will answer very well), carbonic acid, and water " until there is formed a sulphate of magnesia." The magnesia is obtained by precipitation with an alkali from sea water, or from " magnesian limestone."

[Printed, *4d.* No Drawings. Repertory of Arts, vol. 8 (*third series*), p. 534; London Journal (*Newton's*), vol. 6 (*second series*), p. 22.]

A.D. 1828, December 15.—N° 5739.

MORFITT, John.—"A certain improvement in retorts used by " bleachers and makers of oxymuriatic acid or oxymuriate of " lime." This consists in "the application of linings of glazed " earthenware within the upright sides of leaden retorts used" by the above. The linings are in sections, the cracks between are filled up with dust from the same kind of glazed ware.

[Printed, *6d.* Drawing. Repertory of Arts, vol. 8 (*third series*), p. 743; also vol. 9 (*third series*), p. 208; London Journal (*Newton's*), vol. 4 (*second series*), p. 341.]

A.D. 1829, April 28.—N° 5783.

WRIGHT, James.—"Improvements in condensing the gas or " gases produced by the decomposition of muriate of soda and " other substances, which improvements may also be applied to " other purposes." These are, first, "the application of lime for " the absorbing of muriatic gas" and the following mode of applying it:—"A chamber is built from four to six feet high and dome " roofed, having but one outlet in the centre. The bottom is lined " about a foot high with lead;" on the wall around this chamber " are placed "as many decomposing furnaces and driers" "as " can conveniently be wrought or managed; the flues from each " and every meet as in a common receptacle." Into this chamber, through a perforated hose, lime water is thrown by a force pump, " connected with the bottom of the chamber by a pipe, so that the " same water is constantly presented to the gas until all the lime " be completely saturated." The gas unabsorbed makes its escape through the outlet in the centre by means of a horizontal flue into pipes which are connected together by a revolving cylinder, or two of the same, made of wood lined with thin lead and partitioned off into shelves on which are a quantity of slacked lime, ultimately any unabsorbed gas passes into a chimney. The muriate of lime formed may be sold at a price which "will nearly " cover the expence of the operation."

Second. "The more perfect purification of coal gas. The gases " as they come from the retort being passed through lime in so " complete a state of division," the "whole of the sulphuretted " hydrogen is absorbed, leaving the carburetted hydrogen in a " state of great purity." The "gasometer in this case supplies " the place of the chimney in the other; it is necessary it be " balanced with a weight somewhat greater than its own."

Third. The application of these "cylinders alone to the manu- " facture of chlorate of lime is productive of great advantages." The muriate of soda is decomposed in one set of retorts and the oxygen driven off by that alone of the black oxide of manganese in another set, "the pipes from each terminating in a " horizontal main or general receiving pipe on both ends of which " (they being closed of course)" are placed "any number of " cylinders charged with fine lime, which is by this method com- " pletely saturated." The residuum in one set of retorts is sulphate of soda, and in the other is "manganese deprived of a part " of its oxygen; this manganese upon being exposed for a time " in thin stratums to a circulation of atmospheric air (or put " repeatedly through a machine similar to a farmer's fanners) " speedily recovers the oxygen it had lost, and becomes fit for " future operation."

[Printed, 10*d*. Drawing. Repertory of Arts, vol. 8 (*third series*), p. 591; also vol. 11 (*third series*), p. 13; London Journal (*Newton's*), vol. 8 (*second series*), p. 252; Register of Arts and Sciences, vol. 4 (*new series*), p. 130.

A.D. 1829, August 11.—N° 5829.

MAC LEOD, John.—"Certain improvements in preparing or " manufacturing certain substances, so as to produce barilla or " substitute for barilla." The white efflorescence on the Coromandel coast, also on "whole fields on the west side of the Great Pulicate Lake, forty or fifty miles north of Madras," is collected, and washed with water is evaporated to dryness, the residuum "is the karum of the bazars." The impurities are much got rid of "by careful solution and evaporation to dryness" and fusing in a furnace; "being withdrawn and cooled resembled very fine barilla in its most essential properties."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 9 (*third series*), p. 141; London Journal (*Newton's*), vol. 5 (*second series*), p. 152; Register of Arts and Sciences, vol. 4 (*new series*), p. 70.]

A.D. 1830, February 27.—N° 5903.

BRAITHWAITE, John, and ERICSSON, John.—"An improved method of manufacturing salt." "The manufacture of those qualities of salt, the variety of which depends upon the temperature at which the chrystal is formed by heating brine in a close boiler, under pressure, to a degree of heat above that which would be required to form the same quality of salt by the ordinary method, and then causing such brine, so heated as aforesaid, to pass from the close boiler into an open vessel, for the purpose of evaporation at a distance from, and not acted upon by the fire, where the required temperature is obtained, and thence, when too much cooled to deposit salt of the quality required, to return into the boiler to be again heated to its former temperature, and again passed into the open vessel, thus keeping up a constant circulation of brine, through the close boiler and open vessel, and a consequent constant deposit of salt."

[Printed, 10*d*. Drawing. Repertory of Arts, vol. 10 (*third series*), p. 257; London Journal (*Newton's*), vol. 6 (*second series*), p. 249; Mechanic's Magazine, vol. 13, p. 417; Register of Arts and Sciences, vol. 5 (*new series*), p. 9; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 624.]

A.D. 1830, November 29.—N° 6041.

CHURCH, William.—"Certain improvements in apparatus applicable to propelling boats and driving machinery by the agency of steam, parts of which improvements are also applicable to the purposes of evaporation." These are, first, a cylindrical furnace applicable for the boilers of marine engines, which is supplied with fuel from the top by means of a slightly tapered or conical tube the smaller end of which projects down towards the fire. Around this tube is a tube of greater conical form, which leaves a small annular orifice between the bottom ends of the two tubes for forcing a blast of heated air on to the burning fuel and driving the products of combustion into the flue in the boiler for the purpose of heating the same. Fitted to the outside casing of the furnace is an apparatus for supplying boilers with water which consists of a revolving cylinder bored longitudinally with four holes for admitting water into the boiler at stated intervals.

Second, an improved boiler around which are a series of cylinders arranged one within another and forming a refrigerator, the cylinder immediately surrounding the boiler forming a flue space, the other cylinders forming spaces for air and steam in alternate cylinders. The air is forced into the cylinder surrounding the flue by means of a blowing machine, when it travels along the length of the boiler and returns between the two steam cylinders, and passes into a pipe which delivers it in a heated state through the annular orifice of the furnace to support combustion. The steam generated in the boiler passes into a large reservoir above the boiler, from whence it is conducted away, and after having given motion to the engine it is led between the air cylinders surrounding the boiler, where it is partially condensed, the condensed portion being conducted into the water spaces surrounding the furnace, and that portion which is not condensed escaping into the atmosphere.

Third, a vibrating cylinder steam engine.

Fourth, economizing fuel in stills, and consists of a case surrounding the still, which is heated by steam admitted between the still and casing. The vapor from the wash in the still passes into the bottom of a vessel containing two spiral metal passages round each other, where it passes along one spiral passage until it arrives at the end of the channel, where it flows into an ordinary worm tub. At the same time that the vapor from the still is passing one spiral chamber atmospheric or other air is caused to enter the other spiral passage by means of a blowing or exhausting apparatus. The air thus becomes heated in its passage, when it is conveyed to the fuel which heats the still. The watery and empyreumatic particles which existed in the vapour from the still having become condensed trickle down the sides of the spiral channel and run back into the body of the still. The same principles of apparatus as those described with respect to the boiler and still may be applied to the vessels of the brewer, distiller, chemist, rectifier, salt or soap manufacturers, or refiners of sugar.

[Printed, 3*s.* 4*d.* Drawings. London Journal (*Newton's*), vol. 8 (*second series*), p. 1; Register of Arts and Sciences, vol. 6 (*new series*), p. 106; Rolls Chapel Reports, 7th Report, p. 134.]

A.D. 1831, February 21.—N° 6086.

FURNIVAL, William.—"Certain improvements in evaporating "brine." These are, first, "placing angular pipes or tubes within "salt pans in such manner that there is space beneath them for "the deposit of the chrystals as they are formed and descend to "the bottom of such salt pans, and the upper surfaces of the "angular pipes or tubes permit of the chrystals of salt rolling off "from them."

Second, placing "a double cover over the surface of the brine "undergoing evaporation, such double cover being filled with "brine to be heated by steam arising from the salt pan, but such "brine so contained in the double cover not being permitted to "evaporate till it is drawn off into the salt pan, whereby the brine "is prevented forming into chrystals in the said double cover." There are troughs placed on each side of the double cover to receive and convey away condensed steam without permitting it to fall again into the pan. A pipe is attached to the double cover for supplying brine from a reservoir.

[Printed, 8*d.* Drawing. Repertory of Arts, vol. 12 (*third series*), p. 257; London Journal (*Newton's*), vol. 8 (*second series*), p. 145; Register of Arts and Sciences, vol. 6 (*new series*), p. 197; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 624.]

A.D. 1831, March 21.—N° 6096.

PHILLIPS, Peregrine, junior.—"Certain improvements in "manufacturing sulphuric acid, commonly called oil of vitriol." Firstly, causing "an instantaneous union of the sulphurous acid "gas with the oxygen of the atmosphere," and so save saltpetre, and the cost of vitriol chambers, "by drawing them in proper "proportions," by an air pump or otherwise, through "an "ignited tube or tubes of platina, porcelain," or some material not acted on by heated sulphurous acid gas, in which are "fine platina wire, or platina in any finely divided state." The sulphuric acid formed is absorbed by water.

Second, a mode of condensing "the sulphuric acid." A chamber in preference of a circular form, eight feet diameter and thirty feet high, of siliceous stone lined with lead, is filled with pebbles or some substances not acted upon by sulphuric acid. The chamber is made tight, and by an arrangement of a funnel at the top, and a pump which draws the liquid from the bottom and throws it into the funnel, the pebbles are kept moistened. A pipe leading from the ignited tube or tubes, after passing through some water " terminates in this chamber " just above the top of the liquor."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 12 (*third series*), p. 267; London Journal (*Newton's*), vol. 8 (*second series*), p. 202; Register of Arts and Sciences, vol. 6 (*new series*), p. 204.]

A.D. 1831, October 6.—N° 6176.

YOUNG, Peter.—(*A communication.*)—" A new mode of manufacturing manglewursel for the purpose of producing various " known articles of commerce."

[No Specification enrolled.]

A.D. 1831, October 14.—N° 6181.

JUMP, William Ainsworth.—" Certain improvements in " drawing or extracting salt from salt pans." These are " the " continual raking of the salt towards the sides of the pan, and " into pockets or recesses formed to receive it," by " means of " revolving rakes " set " at angle to a line drawn through the " centre of the pan." " An upright shaft to which motion is " imparted," carries an arm on which the scrappers are affixed. The pans are covered.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 16 (*third series*), p. 335; London Journal (*Newton's*), vol. 4 (*conjoined series*), p. 286; Register of Arts and Sciences, vol. 7 (*new series*), p. 138.]

A.D. 1832, March 22.—N° 6247.

BROWN, William Alexander, and HENDRICK, Herman.—" An improved method or methods of manufacturing the " prussiates of potash and soda, and the prussiates of iron; also " for the construction of certain apparatus, vessels, or machinery " to be used in the said manufacture, and a new or improved " method or methods of employing the said prussiate of iron, or

" other prussiates of iron, as a substitute for indigo, in dyeing " all sorts of wools, whether in the fleece, skin, spun, or woven " into cloth, stuffs, or otherwise; also in dyeing silks, cottons, " linens, and in fact all other sorts and descriptions of textile or " other substances fit for the purpose of receiving colour of a " blue, blue black, black, greens, bronze, or any other colours " for which indigo has hitherto been used either as a ground-" work or auxiliary; and also for an improved arrangement of " certain utensils and machinery to be used in the said dyeing " process."

[No Specification enrolled.]

A.D. 1832, March 22.—N° 6249.

YOUNG, Peter.—" A new mode of manufacturing the root " called mangel wurzel for the purpose of producing certain " known articles of commerce." These are, first, spirit. The mangel wurzel is cleaned, reduced to pulp, and pressed; the liquor is brought nearly to boiling, and diluted sulphuric acid in certain proportion added with stirring, " boiling for twelve hours." The acid is neutralized by adding chalk or an alkali, the clear liquor drawn off, fermented with yeast, and the alcohol distilled off.

Second, vinegar. Adding to the pulp in the press so much water, again pressing it, and adding to it a "sufficient quantity " of saccharine matter from sugar, molasses, malt, or corn," to bring it "to the required density, when it should be submitted to " the customary process of making vinegar."

Third, paper. The fibrous matter left in the press is passed between rollers, washed with water and with dilute sulphuric acid, bleached by chlorine or sulphurous acid, and again washed is ready for use, mixed or otherwise.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 14 (*third series*), p. 275; London Journal (*Newton's*), vol. 2 (*conjoined series*), p. 118; Register of Arts and Sciences, vol. 7 (*new series*), p. 299.]

A.D. 1832, June 9.—N° 6276.

LOWE, George.—" Increasing the illuminating power of such " coal-gas as is usually produced in gas works; also, for con-" verting the refuse products from the manufacture of coal-gas " into an article of commerce not heretofore produced therefrom;

" and also for a new mode of conducting the process of condensation in the manufacture of gas for illumination." The processes relating to this subject are, making Prussian blue from ammoniacal liquor and from "refuse lime liquor which has purified the gas." Adding to the ammoniacal liquor so much "sulphate of iron or green vitriol (in solution with water)" "super-saturating the liquor" by adding a large excess of oil of vitriol, "when there will be found a blue precipitate," which, collected, washed, and dried, "is the Prussian blue." With the refuse lime liquor a similar process is followed, but more sulphate of iron is first added, and less oil of vitriol afterwards; the precipitate is mixed with sulphate of lime.

See Abridgements of Specifications upon Gas.

[Printed, 6*d.* Drawing. Repertory of Arts, vol. 15 (*third series*), p. 74; London Journal (*Newton's*), vol. 12 (*conjoined series*), p. 137, and vol. 28 (*conjoined series*), pages 55 and 448; Jurist, vol. 10, p. 363.; Artizan, vol. 4, p. 94; Webster's Reports, vol. 2, p. 158. Extended for five years (see 11,238).]

A.D. 1833, June 20.—N° 6440.

NEWTON, WILLIAM.—(*A communication.*)—"An improved apparatus for boiling, evaporating, and concentrating syrups, for the production of sugar, and also of saline liquors, or for the crystalization of salt, which apparatus may also be employed in the process of distillation," These are, first, "in the adaptation of a blowing machine, air-injecting pump or bellows, worked by a steam engine or other motive power," to force the "air through tubes and other passages into the lower parts of the evaporating pans."

Second, "In the adaptation of certain apparatus by means of which the air may be heated by the agency of steam to any required degree of temperature before entering the evaporating pans or boilers." The air is admitted into cylinders, and forced from thence by pistons through pipes to the lower part of the receiver or heating chamber; and after passing around the steam pipes, the air having become heated passes to the evaporating pans or boilers, through pipes.

Third, the construction and arrangement of the evaporating pans, boilers, alembic or stills, and the steam and air pipes, vessels, tubes, and appendages connected therewith.

[Printed, 3*s.* 4*d.* Drawings. London Journal (*Newton's*), vol. 4 (*conjoined series*), p. 161; Rolls Chapel Reports, 7th Report, p. 145.]

A.D. 1833, July 25.—N° 6453.

PELLETIER, Joseph, and DESPREZ, Jean Adrian.—"Improvements in making or manufacturing sulphate of quinine." This consists in using expressed or distilled oils instead of alcohol. Barks are treated with acid, the quinine, &c. precipitated by lime, the usual method, the precipitate dried, powdered, and exhausted by treating with oil, turpentine preferred, seven or eight times. Where expressed oil is used the lime precipitate above is dissolved in an acid, and the rough quinine precipitated by ammonia, dried, and treated as above with the oil. The quinine in solution by expressed or distilled oils is separated from them by agitating them with acid water, decanting the acid solution, and precipitating therefrom the quinine by an alkali. It is united to sulphuric acid, whitened by animal charcoal, and "crystalized by the method "usually adopted."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 16 (*third series*), p. 201.]

A.D. 1833, October 19.—N° 6488.

TENNANT, John, and CLARK, Thomas.—"A new or improved apparatus to produce or evolve chlorine for manufacturing purposes."

[No Specification enrolled.]

A.D. 1833, October 19.—N° 6490.

ATTWOOD, Charles.—"A certain improvement or improvements in manufacturing or purifying soda.

This is, adding to solutions of soda, whatever they may be, a solution of a salt of iron or manganese, the former preferred, so as carefully to precipitate the sulphur combined as sulphuret, being careful to avoid adding an excess of metallic salt.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 3 (*new series*), p. 11; London Journal (*Newton's*), vol. 5 (*conjoined series*), p. 326.]

A.D. 1833, October 19.—N° 6492.

HENDRIKS, Herman.—(*A communication*.)—Improvements in manufacturing the prussiate of potash and the prussiate of soda, and improvements in dyeing blue colours without indigo. "First, "the process of calcining and constantly agitating the mixture of

" animal and other substances in closed cylinders or other closed " vessels, for producing " the above salts. The mixture is equal parts of animal substances with potash or soda, as the case may be, to which has been added scraps of iron in certain proportion, or peroxide of iron. The animal substances capable of being used are many, but dried blood or hoofs, or both, are preferred. The products are—" hydrogen gas " which " may be employed to " light the establishment." Empyreumatic oil, which is used " with the calcined matter produced by the first calcination." Subcarbonate of ammonia, muriate of ammonia, these are collected in an arrangement of a Woulffe apparatus.

Second, " the fixing the oxide of iron on textile or other sub- " stances, by means of simple or double decomposition of the " protosalt of iron; the fixing the deutoxide of iron on the like " substances by immersing them in a bath formed of the protoxide " of iron in a neutral state; the producing an uniform oxigi- " nation of the protoxide, by means of a current of warm air " and the use of an alkaline and a saponaceous bath before uniting " the oxide of iron with the ferrocyanic acid, and afterwards by " passing them into a bath composed of a soluble ferrocyanate or " prussiate, and thus producing an uniformity of colour; and the " employment of a stove or bath for reviving, increasing, or " diminishing the intensity of colour when dying blues without " indigo."

[Printed, 6s. 2d. Drawings. London Journal (*Newton's*), vol. 17 (*conjoined series*), p. 165.]

A.D. 1833, December 11.—N° 6520.

TORASSA, John Baptiste Constantine, **MUSTON**, Paul Isaac, and **WOOD**, Henry Walker.—(*A communication from Emanuel Montebruno.*)—" Certain improvements in making or " producing the pigment commonly known by the name of white " lead or carbonate of lead."

Pieces of lead, in preference of the shape of shot and size of duck shot, are placed in a vessel lined with lead, and just covered with water, and the vessel rocked from side to side; the shots " roll backward and forward on the bottom of the vessel;" " an extremely fine powder of the lead " is produced. The moist powder, of a dark colour, is passed through a fine sieve, and exposed to atmospheric air for about eight or ten days in a shallow open vessel which is called " the carbonating vessel," keeping it about the consistence of cream and agitating it constantly until it assumes a beautiful white colour."

White lead is thus made "without the use of vinegar, or acetic "or acetious acid," and without the aid of heat, except for the purpose of drying it after it is made.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 2 (*new series*), p. 142; London Journal (*Newton's*), vol. 5 (*conjoined series*), p. 21.]

A.D. 1834, January 16.—N° 6542.

ATTWOOD, CHARLES.—"The art of making a certain pigment "or certain pigments by a certain process or certain processes not "previously used for such purpose or purposes." This consists in using "such prussic acid or such prussiate or prussiates as may "exist in the solutions, lixiviums, lyes, or runnings, and in the "spent or mother lyes or liquors of such soda balls" "manufac-"tured by means of the calcination of certain well-known cus-"tomary mixtures of sulphate of soda with carbonate of lime and "carbonaceous matters or substances," by "whatsoever known "or profitable modes of operation the aforesaid solutions which "contain such prussic acid; or such prussiate or prussiates may "be made available in manufacturing such pigment or pig-"ments." In precipitating Prussian blue from these solutions; these solutions are made acid by such acids as are used in other manufactures of Prussian blue, preferring those acids "as may be "most cheaply and conveniently obtained," and to these are then added such salt or salts of iron as are used in other manufactures of Prussian blue.

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 8 (*conjoined series*), p. 15.]

A.D. 1834, January 25.—N° 6548.

GARROD, WILLIAM.—Improvements in manufacturing salt." These are, "the application of" a boiler, "containing fresh water "over that part of the bottom of the salt pan which is directly "acted on by the fire in the furnace, such boiler being in the "midst of the brine in the salt pan," "for the purpose of prevent-"ing the salt falling on the part of the pan which is directly acted "on by the heat of the fire." Two other pans placed alongside of the first pan containing brine, are heated by means of the steam from the boiler conveyed underneath them by means of a pipe, and there are pipes "by which the condensed steam is permitted " to flow from under the pans."

Printed, 10*d*. Drawing. Repertory of Arts, vol. 3 (*new series*), p. 5; London Journal (*Newton's*), vol. 5 (*conjoined series*), p. 356.]

A.D. 1834, September 6.—N° 6673.

SHERIDAN, John Joseph Charles.—" Certain improvements " in the several processes of saccharine, vinous, and acetous fer- " mentation."

[No Specification enrolled.]

A.D. 1835, March 4.—N° 6783.

SHERIDAN, John Joseph Charles.—" Certain improvements " in the several processes of saccharine, vinous, and acetous fer- " mentation."

[No Specification enrolled.]

A.D. 1835, June 4.—N° 6846.

PHILLIPS, Richard.—" Certain improvements in the process " of manufacturing sulphate of soda." These are, first, " the " liquor which is yielded by the action of air and moisture " upon iron pyrites, is " an aqueous solution of sulphate of iron, or green " vitriol, with excess of sulphuric acid." This liquor is named " the intire liquor." This liquor is mixed with common salt in certain proportions, and heated in a reverberatory furnace " until " acid vapors cease to arise from it." The residue is boiled, the peroxide of iron is allowed to subside, and the clear solution cooled yields " crystals of sulphate of soda."

Second, common salt is mixed with a certain proportion " of " the crystallized sulphate of iron, green copperas, or green " vitriol," and treated as above.

Third, common salt is mixed in certain proportions with the mother liquor of " the intire liquor," after the separation of the crystallized sulphate of iron from it, and treated as above.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 5 (*new series*), p. 170; London Journal (*Newton's*), vol. 8 (*conjoined series*), p. 52; Mechanics' Magazine, vol. 24, p. 347; Patent Journal, vol. 10, p. 213.]

A.D. 1835, November 17.—N° 6932.

SHERIDAN, John Joseph Charles.—" Certain improvements " in the several processes of saccharine, vinous, and acetous fer- " mentation."

[No Specification enrolled.]

A.D. 1836, February 20.—N° 7010.

BARSHAM, John.—" Improvements in the manufacture of " oxalic acid and salacetocella." These are making the above substances " in a series of closed vessels," with " receivers and " condensers," in place of in open vessels, so as to condense the acid vapours. The retorts are heated by water baths; about one-third from the top of the retorts and " all around the interior " " is " a trough, into which fall any of the vapours which may condense," and flow off into the receivers by a tube from each of the retorts. The receivers are connected together by bent tubes; each has a cock for drawing off the condensed liquor. A larger receiver is named the general receiver; into this a small jet of steam under pressure is introduced, and also " the vapours generated in cast- " iron retorts in which saltpetre is heated." By this means it is said " the vapours will be more readily condensed," and " the acid " will be stronger, or of greater specific gravity." There are openings in the retorts to draw off, &c. the liquid for crystallizing as before.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 7 (*new series*), p. 5; London Journal (*Newton's*), vol. 9 (*conjoined series*), p. 161.]

A.D. 1836, March 8.—N° 7023.

SIMMONS, Benjamin.—" Certain improvements in chemical " retorts, stills, and other apparatus, and in the machinery con- " nected therewith, and by the use and employment whereof " various processes can be speedily, conveniently, and economi- " cally performed." These are, first, chemical retorts revolving or vibrating while being heated with fire for the purpose of producing " coal gas, tar, coke, pyroligenous acid, ether, tar " from wood, charcoal, ammonia, animal oil from bones, bone " black, oil gas, prussiate of potash or soda, Prussian blue, and " other substances." The cylindrical portion of the retort which is exposed to the heat has bolted to one of its ends a cylindrical flanch, and to the other end is bolted another cylindrical flanch having a groove formed round its circumference. These two flanches carrying the body of the retort are supported each on two cylindrical friction wheels capable of revolving. The groove in the one flanch, in which two of the friction bearing rollers work, prevents the retort expanding at that end, while the other end is free to expand. The flanches and friction rollers are out of the furnace and beyond the action of the fire. The retort is caused to rotate (or to vibrate only) by means of a wheel fixed on one end, working into a pinion driven by suitable power. The other end of the retort is provided with a door for the admission of the material used, and with suitable fastenings. The interior of the retort is fitted with a central longitudinal pipe which passes out at the driving end of the retort for the escape of the gas, being provided with suitable openings and holes for the entrance of the gas into it; each end of the retort is fitted with suitable diaphragms to confine the heat. An internal scraper is suspended from the longitudinal pipe, and iron balls may be also introduced for the sake of their grinding action. The exit gas pipe is connected by means of a stuffing box to another pipe which conducts the gas to the condensing apparatus. The central part of the retort being most exposed to the heat may be taken out and a new part put in.

Second, relates also to a "revolving chemical still" to be heated with steam, and used for distilling other volatile matters.

[Printed, 1*s*. 4*d*. Rolls Chapel Reports, 7th Report, p. 171.]

A.D. 1836, March 22.—N° 7039.

MAUGHAM, William.—"Certain improvements in the pro-" duction of chloride of lime, and certain other chemical sub-" stances." These are, first, "the exclusive use of these three " operations continuously united together, namely, the production " of sulphate of soda from common salt, the conversion of the " resulting muriatic gas into chlorine, by passing it over moistened " manganese, and the subsequent production of chloride of lime" in apparatus such as the following:—A pipe conveys the hydrochloric acid gas into the top of a long cylinder nearly filled with large fragments of black oxide of manganese, a perforated diaphragm supports the manganese some way from the bottom of the cylinder; the bottom of the cylinder enters water in an oblong chamber, the height of which water is regulated by a bent tube, so that any greater depth of fluid in this chamber is discharged from it; a tube leads out from the top of this chamber into another chamber, "traversed in its length by two or three dia-" phragms of platinum wire gauze;" out of this chamber are three tubes "of platinum, or other suitable material," "traversing" a furnace, "whereby they are kept constantly at a red heat." These join on to a pipe immersed in a vessel of water, and from which issues another tube, communicating with "the ordinary " apparatus used for saturating lime or soda with chlorine." Water is allowed to flow from a pipe at the top of the manganese cylinder, and the manganese cylinder is surrounded with a jacket so as to be "always at a temperature of not less than 130° F." The object, it is said, of passing the chlorine gas through the red-hot cylinder, is to burn "any free hydrogen gas" it may contain, the platinum diaphragms preventing the combustion "from ope-" rating backwards."

Second, "the process of converting sulphuretted hydrogen gas, " which is evolved copiously during certain chemical processes, " into sulphurous acid, by mixing it previously with a sufficient " dose of oxygen, however procured, and burning it in a closed " chamber from a series of jets;" and "whether the sulphurous " acid so produced be converted into sulphuric acid in the ordinary " way by means of nitrate of potash, or by being passed with an " additional dose of oxygen through a red-hot tube."

Third, "the formation of sulphuric acid by the combustion " of sulphuretted hydrogen gas from jets set in closed vessels, " from whatever source that gas may be produced."

Fourth, "the formation of sulphuric acid, by passing a mixture " of sulphurous acid and oxygen gases through a red-hot tube or " tubes heated by the combustion of sulphuretted hydrogen, from " whatever source procured."

By a "disclaimer and memorandum of alteration," inrolled November 30th, 1839, the second head is altered as follows:— "The process of converting sulphuretted hydrogen gas, which is " evolved copiously during certain chemical processes, into sul-" phurous acid, by mixing it previously with a sufficient dose of " oxygen (however procured), and burning it in a closed chamber " from a series of jets, the sulphurous acid so produced being

" converted into sulphuric acid in the ordinary way, by means of " nitrate of potash."

[Printed, 1*s*. Drawing. Repertory of Arts, vol. 13 (*new series*), p. 41; also vol, 13 (*new series*), p. 56, for Disclaimer; London Journal (*Newton's*), vol. 10 (*conjoined series*), p. 222; Webster's Reports, vol. 1, p. 255; Jurist, vol. 6, p. 579; Billing on Patents, pp. 87, 115, and 169; Queen's Bench Reports, vol. 2, p. 406; Law Journal (Queen's Bench), vol. 2 (*new series*), p. 109.]

A.D. 1836, March 29.—N° 7046.

GOSSAGE, William, and BENSON, Edward White.—" An " improvement or improvements in the process of making or " manufacturing ceruse or white lead." These are "exposing to " the action of carbonic acid gas, either pure or mixed with such " other gases as may not be injurious," a "mixture of oxide of " lead" (litharge or massicot), with "acetic acid, or acetate of " lead and water, in such proportion that the acetic acid would " not be capable of dissolving more than one-fourth part of the " oxide of lead, when assisted by water." It has been found best to mix the oxide of lead with a full proportion of acetic acid or acetate of lead, the proportions are given, and to add oxide from time to time, as it becomes converted into carbonate, keeping "the " mixture in the requisite state of dampness by the addition of " water."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 11 (*new series*), p. 362; London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 370.]

A.D. 1836, April 12.—N° 7061.

LEIGHTON, Thomas Hodgson.—" Certain improvements in " the converting sulphate of soda into the sub-carbonate of soda " or mineral alkali." First, " the application of steam into and " with the materials in the furnace in the process of converting " sulphate of soda into subcarbonate of soda or mineral alkali." The coal and lime or chalk, in certain proportions, are thrown into the furnace, brought to a state of ignition, the steam turned on, and the sulphate of soda added gradually with stirring. The mixture is not allowed to flux, and when tested if it gives no precipitate in a " solution of muriate of barytes," the heating is complete.

Second. Running streams of hot water through the calcined material placed in a vat with its bottom perforated, collecting the "subcarbonate" solution, and purifying it or a solution of "subcarbonate" "produced in the ordinary way" by forcing carbonic acid into it.

Third. Permitting the materials in the vat after drawing off the solution of subcarbonate of soda to remain, and "heat," by which "sulphuret of lime is now formed," washing out the sulphuret with boiling water, and precipitating the sulphur from it by muriatic acid.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 10 (*new series*), p. 45; London Journal (*Newton's*), vol. 12 (*conjoined series*), p. 285.]

A.D. 1836, June 2.—N° 7105.

GOSSAGE, William.—"Certain improvements in the apparatus or means used for evaporating water from saline solutions, "and in the construction of stoves for drying salts." These are, first, "the peculiar apparatus through which air is caused to pass "into the solution undergoing evaporation, the shape or form of "which apertures may be varied so long as they preserve the "essential character of a notch or indentation cut out from the "edge of a plate, and do not become cylindrical or other shaped "holes perforated through a plate." "Currents of air are intro-"duced" into the saline solutions under operation by means of "inverted air vessels, having notches or indentations formed "on their lower edges." These vessels are suspended by cords passed over pullies and counterbalanced by weights, so that when required they are raised easily out of the solution; branch pipes from the main supply pipe leading from the air pump are passed under the edge of the air vessels, so as to deliver the air into the said vessels, from whence it escapes in bubbles by the notches. The air "may be previously passed over a stove or cockle, or "through tubes placed in a furnace, so as to raise its temperature."

Second. "The employment or use of these said apertures in con-"junction with such inverted air vessels," or "with such other "air vessels as may admit of the use of such apparatus."

Third. "The construction and application of a hot-air chamber," in conjunction with an air vessel constructed with the apertures for the passage of the heated air. The vessels are constructed the same as above, except that they have chambers which communicate by means of pipes with a hot-air stove.

Fourth. "The application of the heated air and vapours ob-"tained" when using the last apparatus, "such application being "made to the purpose of communicating heat to drying stoves or "to evaporating pans," causing the pipes conducting from the air vessels "to the exhausting pump to be carried through the "stoves requiring to be heated, and the temperature of these "apartments is thereby increased." Also, "causing this hot "air and vapours to pass through pipes laid in solutions to be "evaporated," or in preference "causing this hot air and vapours "to pass through a chamber formed under the bottom of an "evaporating pan before reaching the exhausting pump."

Fifth. "In the construction of stoves for drying salts," instead of a single flue, as is generally done, constructing a double flue, or two flues, one placed over the other, and separated by two rows of iron plates with a space between them, connecting a series of metallic tubes with the space between the two plates, carrying these tubes down the lower flue and conducting their lower ends through the walls of the flue, these ends being left open to the atmosphere of the stove. The air contained within the tubes becoming heated rises into the space or vacancy between the plates, and thus acquires a further portion of heat before it escapes into the stove. The space between the two plates is divided into a series of compartments, and the tubes are connected "with these "compartments alternately at one side and other side of the "flues."

[Printed, 1*s*. Drawings. Rolls Chapel Reports, 7th Report, p. 176.]

A.D. 1836, June 13.—N° 7115.

BERRY, Miles. — "An improved apparatus for torrefying, "baking, and roasting vegetable substances, which, with certain "modifications and additions, is also applicable to the evapora-"tion and concentration of saccharine juices and other liquids." These are, in torrefying, baking, or roasting substances such as wheat, potate, starch, flour or fecula, grain seeds whole or un-ground, and is particularly applicable to the process of manufacturing British gum in two cylindrical retorts or torrefying chambers heated by a furnace common to both. The lower parts of each of the chambers are provided with jackets to receive oil, thereby forming a hot bath for the chambers; or they may be exposed to the naked fire. The two chambers are provided with agitators with blades with bevil edges notched or indented like the teeth of a saw, which rake up or agitate the starch or other substance to be roasted. During the time the oil in the jacket is being heated the torrefying retort should be charged with starch or other substance to be operated upon, the agitator is set in motion when the heat has reached from about 250° to 266° Faht., and will thus evaporate the greater part of the moisture of the substances contained in the chamber. Where the torrefaction has been completed the heated oil is withdrawn from the jacket by means of a cock and refilled with cold oil, the damper of the furnace being closed at the same time, the agitator still continuing to revolve until the heat is lowered. When this takes place the torrefied substances can be extracted from the chamber and placed in large wooden troughs, and there spread on the bottom to cool, after which they are to be sifted and stored away in barrels. With certain modifications the torrefying apparatus might be rendered applicable to the evaporation and concentration of syrups and saccharine juices or saline solutions, in which case the jacket or bath is first filled with oil, the fire lighted, and the proper quantity of the liquid solution to be operated upon is poured into the boiler; when the liquid has reached about 112° Fahr. the agitator must be made to revolve until the liquid is sufficiently concentrated. The damper of the furnace should then be closed, and the revolution of the agitator stopped; a cock fitted in the boiler is then opened to draw off the concentrated liquid into suitable vessels. The vapour from the boiler may, if desired, be drawn off by means of a fan or ventilator and passed to a still or worm where, becoming condensed by the cold water surrounding the worm, the condensed water will drop into a receiver. The last head of the invention relates to the concentration and evaporation in vacuo of syrups and other liquid solutions. The boiler in this case is made similar to that described with regard to the torrefying apparatus. The vacuum is produced by the condensation of steam, which passes from a boiler through the evaporating vessel to the centre of a condensing apparatus or refrigerator which is divided into two parts; the upper part is formed of several closed chambers, and the lower part is formed of several thin closed chambers; these chambers are placed one over another in a worm or zig-zag shape. An outer casing surrounds this worm, within which cold air is forced by means of a fan. To produce the vacuum the steam and vapour from the evaporating vessel first rise into the upper part of the worm and arrive at one of two air-tight condensing vessels filled with steam and plunged in a tank filled with water, and when such vessel is full of steam a stream of water from a reservoir is injected into the condensing vessel, a condensation takes place, and the condensed steam descends into the lower part and falls into a receiver, together with all the air it may have carried with it; thus a vacuum is produced in the apparatus. If saccharine or other solution be used for cooling the condenser in conjunction with the ventilator the syrup or solution must arrive by two separate pipes, one leading to the surface of the upper closed chambers, and the other leading to the upper one of the thin closed chambers. The syrup or solution will be transmitted from one to the other, and become cooled by their exposure to the air forced in the fan, and thus will be produced a considerable concentration of the juices. In order to preserve the vacuum in the apparatus while a certain quantity of air and vapour is collecting in the left-hand condensing vessel which is in connexion with the refrigerator, the vacuum will be created in the right-hand condensing vessel by means of a pipe leading the steam to the top of the right-hand vessel and out by another pipe placed at the bottom of the same. This operation is repeated by using alternately the right or left hand condensing vessels as often as is necessary. When the operation is terminated the air must be admitted into the boiler, the cock for emptying the boiler opened, and the concentrated fluid allowed to run off into appropriate vessels.

[Printed, 1*s*. 2*d*. Drawings. London Journal (*Newton's*), vol. 10 (*conjoined series*), p. 257; Rolls Chapel Reports, 7th Report, p. 176.]

A.D. 1836, June 2.—Nº 7131.

WOOLRICH, John.—"Certain improvements in producing or "making the substance commonly called or known by the name "of carbonate of baryta or carbonate of barytes." These are making the above substance by passing carbonic acid gas through a solution of the sulphuret of barium, the precipitate is filtered, washed, dried, and heated in "a hot stove for an hour." The carbonic acid gas used may be procured in any way, but in preference it is obtained from the vessel in which sulphate of barytes and charcoal, or coke in powder, are calcined so as to convert the sulphate of barytes into the sulphuret of barium, by means of a pipe from the vessel.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 10 (*new series*), p. 48; London Journal (*Newton's*), vol. 12 (*conjoined series*), p. 281.]

A.D. 1836, July 27.—N° 7156.

SPENCE, Peter.—"Certain improvements in the manufacture "of prussian blue, prussiate of potash, and plaster of Paris." The refuse of lime liquor of the gas works is found to be of different qualities. Liquors, a gallon of which become acid when less than one pound of oil of vitriol is added to them, are classed as "weak liquors," all liquors which are not acid as above are "strong liquors." The weak liquors are treated as follows for all of the above products. Sulphate of iron and slacked lime, both in certain proportions, are made into the consistence of cream, and poured into the vat of liquor, with stirring, leaving the whole for twelve hours. After which oil of vitriol is gradually added, until the liquid, when tested with a solution of sulphate of iron, gives no black colour, but a light green colour. The whole of the liquor with the precipitate is thrown upon a filter, and the sulphate of lime, washed, made into a large bed exposed to the rain for six months, and is "burnt or boiled in the ordinary way of "manufacturing plaster of Paris." The saturated liquor from the filtrate is treated with a solution of sulphate of iron in certain proportions. A precipitate of a light green colour in a short time falls, and is washed, this is "named coarse blue." Prussian blue is made by boiling coarse blue with a solution containing a certain quantity of alkali, filtering, adding to the filtered solution a solution of sulphate of iron, adding muriatic acid until the precipitate is of a dark blue, when it is washed, &c. Prussiate of potash is made by heating the coarse blue with a solution of potash for some hours, filtering, and evaporating the solution "till "a pellicle forms upon its surface," when it is allowed to crystallize. When the oil of vitriol is gradually added, as above, sulphuretted hydrogen is evolved and should be conducted into a chamber for making oil of vitriol.

The stronger liquors are treated as follows. Sulphate of iron solution is treated with a certain proportion of ammoniacal gas liquor, the precipitate collected, washed, and added to a certain quantity of the liquor, and the whole evaporated to dryness, so "as not in the least degree to burn it." Prussian blue is made by grinding this residue to a coarse powder, heating it with a solution of alkali, collecting the liquid, bringing it to boil, adding a metallic oxide, oxide of iron preferred, so as to remove sulphur; the liquid filtered, a solution of sulphate of iron added to it, muriatic acid next added, and the precipitate washed, &c. To make prussiate of potash, the coarse powder is heated with a solution of potash or pearl ash, the liquid filtered and boiled with oxide of iron, the precipitate removed, and the liquid evaporated to crystallization.

Refuse dry lime of the gas works is employed, as follows, for making "prussian blue and prussiate of potash." The dry lime is stirred in a vat with warm water for a number of hours. To make prussian blue this solution is boiled with the oxide of iron, and the solution treated with muriate of iron so long as there is a precipitate, and muriatic acid added until it is of a deep blue. To make prussiate of potash, potash or pearl ash, dissolved in a small quantity of water, is added to the solution of the dry lime as long as there is a white precipitate; draw off the liquid, boil with oxide of iron, and evaporate the solution to a pellicle, and crystallize. The proportions in which most of the substances to be used are employed, are given.

[Printed, 6*d*. No Drawings. Repertory of Arts, vol. 9 (*new series*), p. 39 London Journal (*Newton's*), vol. 12 (*conjoined series*), p. 81.]

A.D. 1836, August 17.—N° 7175.

HALL, Joseph.—"Improvements in the manufacture of salt." These are "attaching a scraper or scrapers" in a salt pan "capa-" ble of being drawn to and fro in order to remove the salt into " pockets or receivers in closed pans:" the pockets are shown as at each end of the pan. The scraper is in preference of many pieces of iron, each piece suspended by a chain to a bar on which there are two pulleys, round which pulleys two chains pass, and these chains pass round drums, the axes of which drums turn in the cover of the salt pan, one axis passing through the cover so as to attach to it a crank handle.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 9, *new series*), p. 74.]

A.D. 1836, September 15.—N° 7186.

TEALDI, Peter Ascanius.—"A new extract or vegetable " acid, obtained from substances not hitherto used for that pur-" pose, which may be employed in various processes of manufac-" ture and in culinary or other useful purposes, together with the " process of obtaining the same."

[No Specification enrolled.]

A.D. 1836, September 28.—N° 7196.

CLAY, William Neale.—" Improvements in the manufacture " of sulphate of soda." These are " the condensation of the " muriatic acid gas " disengaged " in decomposing common salt " with sulphuric acid " in " open reverberatory furnaces, after it " has in some degree cooled over water " in a long horizontal flue, and deposited the soot, with which it is intermixed, in a chamber such as is used by lamp-black manufacturers, afterwards passing it into a " horizontal flue containing bricks, cokes, or other " materials ;" a pipe over the materials, perforated with small holes, showers water under pressure all along this chamber. The end of this flue communicates with the chimney.

[Printed, 6d. Drawing. Repertory of arts, vol 7 (*new series*), p. 298.]

A.D. 1836, October 13.—N° 7207.

HEMMING, John.—" Improvements in the manufacture of " white lead." Purified nitrate of potash or of soda, the latter preferred, is distilled with sulphuric acid to separate the nitric acid. The sulphate of soda is converted into carbonate of soda by heating it " in a reverberatory furnace with coal, lime, or chalk." Oxide of lead is dissolved in the nitric acid prepared above, and the oxide thrown down as carbonate by a solution of the carbonate of soda.

[Printed, 4d. No Drawings. London Journal (*Newton's*), vol. 12 (*conjoined series*), p. 279.]

A.D. 1836, October 13.—N° 7208.

LUTWYCHE, Thomas.—" Certain improvements in the con- " struction of apparatus used in the decomposition of common " salt, and in the mode or method of working or using the " same." These are, first, the decomposing furnace, having " two beds or floors, one about six inches lower than the other," and " over them is formed an arch of fire bricks or of fire tiles," which separates the oven or chamber from the fire, and prevents the flame and smoke coming into contact with the materials under operation. There are three doors, two in the lower bed, charging doors, one in upper bed for removing the sulphate of soda. When the charge in the lower bed is partially decomposed it is removed on to the upper bed, and the lower bed recharged, so that there are always two portions undergoing decomposition at the same time.

Second, the apparatus and method of "conducting the "muriatic acid in pipes under water and inverted jars." This is a series of conducting pipes, five in number, placed in a triangle, with the water nearly up to the mouths or apertures of the pipes; over these mouths are inverted jars which form joints; at the bottom of each pipe is a small branch pipe for any acid condensed in its passage to drop into a jar underneath.

[Printed, 8*d*. Drawing. London Journal (*Newton's*), vol. 11 (*conjoined series*), p. 139; Rolls Chapel Reports, 7th Report, p. 190.]

A.D. 1836, October 20.—N° 7211.

SHERIDAN, John Joseph Charles.—"Certain improve-"ments in the several processes of saccharine, vinous, and "acetous fermentation." These are, in reference to this subject, the "process by which vinous or spirituous liquids are converted "into acetic acid or vinegar." This is carried on in two air-tight metal vessels entirely lined with wood; a condenser is placed between them and connected with each other by pipes. The condenser is "either of pure tin or of pure tin mixed with one-tenth "of copper." A coil of pipe of the same metal for the introduction of steam lies at the bottom of each vessel and passing through each from side to side. A coil of pipe of the same metal perforated with small holes of the diameter of the thirtieth part of an inch lies also on the bottom of each vessel. Each vessel has a tin pipe four inches in diameter fixed to the head, which communicates with an air pump and fitted with a stop-cock, and has also a similar pipe fixed to the top and plunging through the top of the other vessel into the middle of it to within six inches of the bottom. In working, the vessels are three parts filled with the wash; one of the vats is brought to 115° F. by steam through the coil of pipe not perforated. "The air pump is set to work "at a vacuum of twenty inches of mercury, and an air cock fixed "outside of the vessel to the perforated coil is then opened, and "air at a temperature of 115° is admitted through the air cock," thus throwing warm air through the body of the wash. From the surface of the wash heated air and a portion of alcohol rise, and escape through the pipe and descend into the bottom of the vat which has been kept cold; the alcohol is condensed in the liquid, and the air thus forced from the alcohol is drawn off through the pump. "By impoverishing the said wash" of spirit, "renders it "more apt to turn acid. The effect of the hot rarified air is to "cause absorption of the oxygen to take place." "When the "air pump has thus been worked for about twelve hours the vat "previously heated is left to cool for four or five hours, and the "second vessel is raised to 115° F.," and the process is proceeded with as above.

[Printed, 6*d*. No Drawings.]

A.D. 1836, December 21.—N° 7264.

SWINDELLS, John.—"Certain improvements in the process "of effecting the decomposition of muriate of soda or common "salt." The materials usually employed are put into close vessels into which steam or hot-air pipes are brought, an agitator is fitted in the interior, which is worked whilst steam and hot air is injected until all the hydrochloric acid is evolved, which is condensed in water along with the steam, and so prevented from vitiating the atmosphere. The residuum is dried down in a furnace in the usual manner, and finished as before.

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 10 (*conjoined series*), p. 301; Rolls Chapel Reports, 7th Report p. 182.]

A.D. 1836, December 24.—N° 7267

GOSSAGE, William.—"Certain improved apparatus for de-"composing common salt, and for condensing and making use "of the gaseous product of such decomposition, also certain "improvements in the modes of conducting these processes." These are, first, the construction of the reverberatory furnace and flues, built within a tight casing of iron which surrounds the brickwork, which iron casing "is protected from the action of "the muriatic gas by dry ground clay or other material placed "in a space or chamber formed between the casing and the "brickwork."

Second, the "construction and adaptation of an hydraulic "valve formed of stone, applied to the purpose of opening and "closing the communication" between the furnace and the "first condensing apparatus or chamber." The valve is cut out of stone, two projections stop the passage way or channel when sufficient water is introduced therein "but when this water is "withdrawn these ways or channels are open."

Third, "the condensing apparatus formed of stone or brick-"work made tight by a casing of clay," providing "for the "introduction of muriatic gas at the upper part," and for its descending amongst the materials exposed to its action, and for separating the liquid from the gaseous products, "the former "being received in a stone vessel or trough constructed as an "hydraulic valve," "whilst the gaseous product is conducted "off by a separate channel."

Fourth, "the construction and adaptation" of the "furnace, "flues, valves, and first condensing apparatus" applied as above, "for condensing and immediately making use of a "portion of the muriatic gas evolved," without permitting the gas "to act on the metallic parts of the apparatus so as to "liberate hydrogen gas to an injurious extent." The operation of condensing is varied "according to the substances in which "it is wished to produce a chemical action, and the products to "be obtained therefrom."

Fifth, the "construction and adaptation of condensing appa-"ratus or tower for separating muriatic gas from smoke," consisting "in the application of a deep bed of materials furnishing "extensive surfaces, over which water is caused to pass in the "same direction as the smoke and gas."

Sixth. "The improved mode or method of conducting the "operations for effecting" the above.

[Printed, 1*s.* 8*d.* Drawings. Repertory of Arts, vol. 10 (*new series*), p. 372; Rolls Chapel Reports, 7th Report, p. 182.]

A.D. 1837, January 11.—N° 7274.

SHERIDAN, Charles.—"Improvements in the manufacture "of soda."

[No Specification enrolled.]

A.D. 1837, January 11.—N° 7275.

NEUMANN, John Paul.—(*A communication.*)—"Improve-"ments in the manufacture of prussiate of potash and prussiate "of soda." These are "causing the heat and flame to act directly "on the materials, and give off the requisite heat thereto, and "also to burn or destroy the fetid vapours arising in that part "of the process" of making the above. The pot is set in sand in case of leakage, and the furnace "is for the most part similar "to an ordinary reverberatory furnace."

[Printed, 10*d*. Drawing. Repertory of Arts, vol. 8 (*new series*), p. 283; London Journal (*Newton's*), vol. 12 (*conjoined series*), p. 134.]

A.D. 1837, January 11.—N° 7276.

GOODLET, George.—"A new and improved mode of distilling "spirits from wash and other articles, also applicable to general "purposes of rectifying, boiling, evaporating, or concentrating." This consists in "causing the fluids, to be operated on for the pur-"pose of evaporation, to circulate through pipes or other vessels "acted on by steam, hot water, oil, or other suitable heated fluid "contained in proper vessels." In reference to this subject, "suppose a reservoir, which may be of wood or any other suitable "material, with a spout or vent of a convenient length to suit the "premises, placed above the said reservoir, allowing the steam to "get quickly away; this reservoir being charged with the fluid to "be operated upon, and a connection being formed with it and "the circulating pipes in the heated medium, the fluid, with the "aid of a force pump or otherwise, is made to pass through the "said circulating pipes and returned by the ejection pipe entering "at the under part of said steam spout or vent. The steam "immediately ascends with great force, and the concentrated fluid "falls into the reservoir to be recirculated until the process be "finished; or the heated fluid from the circulating pipe may enter "below the surface of the fluid in the reservoir. As applied to "the evaporation of sea water, brine, soap lees, and other articles, "an additional vessel may be used placed below said spout or vent, "in order to have an adequate space to collect the salt or sub-"stances and allow the fluid to return to the reservoir for cir-"culation."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 8 (*new series*), p. 238.]

A.D. 1837, January 11.—N° 7277.

SPILSBURY, Francis Gybbon, and MAUGHAM, William. —"Certain improvements in the manufacture of carbonate of "soda." These are, first, "the application of a jet or jets of "steam playing into the flue or flues of the ordinary decom-

" posing furnaces employed by alkali makers," " when performing that part of the process of making carbonate of soda " which consists in converting muriate of soda into sulphates," the object being to condense the muriatic acid gas given off.

Second, converting muriate of soda into fluoride of sodium or fluosilicate of soda, the latter preferred, by mixing the muriate with its weight of concentrated fluoric acid, obtained from Derbyshire spar " by any of the usual methods," adding water, and if a fluosilicate adding "ground flint or silicious matter." The supernatant liquid is drawn off, the fluosilicate of soda, slightly washed and heated to a low red heat, is mixed with a certain weight of chalk or limestone and boiled for several hours; insoluble fluosilicate of lime is formed, and carbonate of soda is in solution, and is obtained by evaporation, &c.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 8 (*new series*), p. 347; London Journal (*Newton's*), vol. 10 (*conjoined series*), p. 299. Patent Journal, vol. 10, p. 213.]

A.D. 1837, January 11.—N° 7280.

SEWELL, Thomas Robert.—" Certain improvements in the " manufacture of white lead." These are the apparatus used in, and mode of "heating metallic or blue lead by the combustion " of charcoal ,in order to dispose it to combine with the oxygen " of the atmosphere, which is drawn through the furnace in con " nection with the retention and application of the carbonic acid " gas so generated to the purpose of carbonating oxide of lead." A quantity of ignited charcoal is placed contiguous to a long covered vessel in which is the melted lead at a low red heat, which becomes oxidated by the oxygen of the atmosphere, which, together with the carbonic acid of the burning charcoal, is drawn over it by means of an air pump. The oxygen not taken up by the lead, and the carbonic acid are drawn into a chamber, the same into which the oxide of lead is either drawn or pushed. The gases are further drawn into a vessel with water to cool them; they are then drawn through the air pump, and are forced into another vessel, which forms a reservoir for supplying a continuous current of the gas into a chamber in which are oxide of lead and acetic acid.

[Printed, 10*d*. Drawing. London Journal (*Newton's*), vol. 15 (*conjoined series*), p. 1; Rolls Chapel Reports, 7th Report, p. 183.]

A.D. 1837, January 19.—N° 7284.

GOSSAGE, WILLIAM.—" Certain improvements in manufac-" turing oxide of lead, applicable to making paints and to other " purposes; also certain improvements in the process of bleach-" ing and purifying oils suitable for mixing paints and other " oils and fatty matters." The matters relating to this subject are, first, the application of heat to lead when " converting it " into fused oxide or litharge," " through the medium of the " oxydizing vessel which contains the lead," thus preventing the contact of flame or smoke during oxidation.

Second, " the use of a current of air previously heated " by means of any of the well-known apparatus without passing it through burning fuel, " this hot blast being used in place of " the blast of cold air hitherto employed." The air is passed through tubes in a furnace. The melted litharge is prevented from acting on the iron vessel by having a portion of the vessel cooled so as to solidify the litharge in contact with it. This is effected by a channel in which water circulates. Another mode is to have a groove in the vessel which is filled with compressed bone ash applied " as in making the ordinary cupels."

[Printed, 10*d*. Drawing. Rolls Chapel Reports, 7th Report, p. 183.]

A.D. 1837, February 6.—N° 7296.

LINNING, MICHAEL.—" Method of operating for the purpose of converting peat moss and peat turf or bog into fuel, and " obtaining from it tar, gas, and other certain substances or " matters." The mosses or bog should be reduced by means of suitable grinding and mixing apparatus to a homogeneous pulpy mass, then spread out and cut or moulded into any desired shape. These shapes, say of bricks, are then compressed by suitable means, and dried in a kiln or in the air. From this fuel, when burned, there is obtained as residuary matters certain substances which may be employed as colouring matters, and as substitutes for ivory black, Roman ochre, or English umber. Coke may be made from the same fuel, and tar will be obtained suitable for smearing sheep and other purposes. " By heating the fuel in a " close vessel or retort, gas, ammonia, oil, and materials of which " candles may be made, and which may be used as a varnish, are

" produced besides the coke and tar." " A strong fuel is " obtained by mixing the material in a high dried state, or in its " coke, with its own tar."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 11 (*new series*), p. 177; London Journal (*Newton's*), vol. 11 (*conjoined series*), p. 347; also vol. 20 *conjoined series*), p. 139.]

A.D. 1837, March 15.—N° 7326.

MAUGHAM, William.—" Improvements in the manufacture " of white lead." These are, " the conversion of protoxide of " lead, or a mixture of protoxide and chloride of lead, into " carbonic or white lead, by the direct action of artificially pre- " pared carbonic acid gas." The carbonic acid may be obtained by driving air through a charcoal furnace, passing it through a wash bottle, and into the mixed oxide and chloride made into a cream with water.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 9 (*new series*), p. 166.]

A.D. 1837, May 8.—N° 7365.

BELL, Thomas.—" Improvements in the manufacture of sul- " phate of soda, which improvements or parts thereof are appli- " cable to other purposes." These are, first, combining a " quad- " rangular iron " " triangle trough " " with fire-brick or tile or " slabs of stone " outside and inside; the fire is applied outside, and passes from below over the top of the furnace arched with brick. The iron trough may be of any other shape, and it may be dispensed with when the furnace is used in making chlorine.

[Printed, 10*d*. Drawing. Repertory of Arts, vol. 9 (*new series*), p. 68.]

A.D. 1837, August 17.—N° 7416.

GOSSAGE, William.—" Certain improvements in the processes " or operations connected with the manufacture of alkali from " common salt, and with the use of the products obtained there- " from." These are, first, the preparation of artificial oxide of manganese from the precipitated protoxide, by causing it while in the state of hydrate to be agitated with atmospheric air so " as to " absorb oxygen " from it, and " the use of the oxide so prepared " for the purpose of producing chlorine by means of muriatic acid " obtained from the decomposition of common salt." The oxide of manganese may be introduced into the condensing chamber described in No. 7267, and acted on by the muriatic acid evolved from the common salt and sulphuric acid in the furnace, the result is chloride of manganese and chlorine gas. The result is the same when oxide of manganese is treated with a solution of muriatic acid. The solution of chloride of manganese is agitated strongly after adding cream of lime; soluble chloride of calcium is formed, and protoxide of manganese is separated and converted into peroxide as above.

Second, "the use of alkali residuum for obtaining therefrom " sulphuretted hydrogen by means of muriatic acid or carbonic " acid or the combined use of these two acids acting on the alkali " residuum." The alkali residuum may be placed in the condenser in place of the manganese above; the mixed gas, carbonic acid, and sulphuretted hydrogen may be exposed to " another " portion of alkali residuum. The carbonic acid reacts on the " sulphuret of calcium and liberates therefrom a further quantity " of sulphuretted hydrogen." The sulphuretted hydrogen is burned for making sulphuric acid, and the carbonate of lime obtained from the residuum is used " for purposes connected with the manu- " facture of alkali instead of native carbonate of lime."

[Printed, *4d.* No Drawings. Repertory of Arts, vol. 10 (*new series*), p. 386; London Journal (*Newton's*), vol. 17 (*conjoined series*), p. 226.]

A.D. 1837, August 31.—Nº 7426.

SHERIDAN, John Joseph Charles.—" Improvements in the " manufacture of soda." These are " the decomposition of com- " mon salt, caused by bringing the salt, when in a state of vapour, " to come in contact (at the temperature of a bright red heat,) " with the steam of water or with hydrogen at a very high tempe- " rature." Two kilns are used similar to a potter's oven built in the form of a cone. The oven in which the salt is put is entirely surrounded with fire from two fire-grates except just at the top, from which a tube six inches in diameter leads in a curve into the other cone, through the top to within four feet of the bottom. Two fire-grates heat this oven but not under the bottom; a tube for the purpose of admitting steam enters through the side of this cone, whilst another tube comes out near the top for the escape of hydrochloric acid. These cones are surrounded by another cone in which there are six fires with flues under and over the cones. In the first oven is a manhole by which the salt is fed into it, and near the bottom of the second cone is a manhole by which to take out the soda. When "the heat volatilizes" the salt, the vapour "finds "its way along the iron tube" into the cone, "which like the "other is kept at a bright red heat," and meeting the steam "is "decomposed," the "pure soda precipitates to the bottom" and muriatic acid is evolved into the atmosphere or into a condenser.

[Printed, 1*s*. 2*d*. Drawings. London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 151.]

A.D. 1837, September 30.—Nº 7440.

CLARK, Thomas.—"Improved apparatus to be used in manu-"facturing sulphuric acid."

[No Specification enrolled.]

A.D. 1837, November 4.—Nº 7460.

MIDGLEY, George Deakin, and KYAN, John Howard. "An improved mode of extracting ammoniacal salts from liquor "produced in the manufacture of coal gas." A waggon shaped iron vessel, large enough to contain the charge of liquor, has an agitator through its centre, and a hopper on the top with a grating into which is put so much slacked lime, and the ammoniacal liquor is filtered through this into the vessel; there is also another passage into the vessel if required. The agitator is set in motion, the contents of this vessel is run by a tube with a stop cock into the still, which also has an agitator in the lower part, a thermometer in the upper part, and the head surrounded with a jacket of cold water, which is constantly running; a condenser is attached to the still. The still is heated by a jacket of steam and worked at a temperature of "from 170° to 200 of Fahrenheit." Acids are added to the distilled liquor and the salts crystallized.

[Printed, 10*d*. Drawing. Repertory of Arts, vol. 10 (*new series*), p. 11; London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 30.]

A.D. 1837, December 23.—Nº 7521.

BUTTON, Charles, and DYAR, Harrison Grey.—"Im-"provements in the manufacture of white lead." These are first the vapours and gases arising from coal, such as "anthracite or stone "coal or mineral coal or coke," in place of charcoal, are mixed

" with some air and passed through a washing vessel containing " water and a mixture of carbonate of soda, whiting, and carbonate " of lead, or white lead, or other chemical materials," known to absorb "sulphuretted hydrogen and sulphurous acid," and destroy the impurities, and using "the carbonic acid gas obtained there- " from in the process of manufacturing white lead."

Second, "manufacturing of white lead from compounds of " nitric acid with oxide of lead, in which the quantity of oxide of " lead bears a greater ratio to the nitric acid combined therewith " than the oxide of lead bears to the nitric acid in the ordinary " nitrate of lead of commerce, and which nitrates we call and are " known by the name of basic nitrates of lead."

Third, "making of white lead by uniting and acting upon or " mixing litharge, massicott, or protoxide of lead with nitrate of " lead, (which uniting and acting upon or mixing are best affected " by boiling" but "may be obtained, though not so advantageously, " without boiling,) and submitting the same so mixed together " to the action of or bringing the same so mixed together minutely " into contact with carbonic acid in order to produce carbonate of " lead, or as it is usually called white lead, and in such manner " that the same nitrate of lead may be used over and over again " many times with fresh portions of litharge, massicott, or pro- " toxide of lead."

[Printed, 10*d*. Drawing. Repertory of Arts, vol. 10 (*new series*), p. 270; London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 383.]

A.D. 1837, December 23.—N° 7523.

LOSH, William.—"Improvements in decomposing muriate of " soda, applicable to the condensing vapours of other processes." These are "aiding or producing the requisite draft to furnaces in " which the decomposition of muriate of soda is being carried on " by means of small currents or jets of water propelled with suffi- " cient velocity to produce that effect through an opening or " openings in the flue from the furnace, such currents tending " to, and for the most part, if not wholly, to condense the muriatic " acid." The pipe, earthenware, leaden, "or otherwise having " several small holes, say about one-sixteenth of an inch diameter," enters from the roof of the furnace. The water is forced by extreme pressure, and is received into a well, from which there "are overflow pipes by which the water and condensed acid are "permitted to flow away into a receiver."

[Printed, 1s. Drawing. Repertory of Arts, vol. 10 (*new series*) p. 217; London Journal (*Newton's*), vol. 12 (*conjoined series*), p. 284.]

A.D. 1838, January 5.—No. 7531.

WATT, CHARLES, and TEBBUTT, THOMAS RAINFORTH.—"Certain improvements in the manufacture of oxides of lead, "and also of the carbonate of lead." These are, first, "protoxide "of lead or litharge" is boiled with a chloride of the alkalies or of barium, the chloride of lead formed is mixed with one fourth of red oxide of lead or lead, and the whole gently heated in a retort with "concentrated sulphuric acid;" "the chlorine thus "formed" is passed into an apparatus, such as is used "in "making chlorides of lime, soda, &c." The sulphate of lead is washed with lime water, and afterwards a solution of some alkaline or earthy carbonate "is added, with stirring until effervescence ceases; the sulphate of lead has now become a white "hydrate containing much carbonate;" to ensure it "a perfect "carbonate" it is agitated in a "Woolf's apparatus," whilst carbonic acid gas is being passed into it, it is then washed.

Second, chloride of lead is treated with nitric acid, chlorine passes off into some apparatus as above, the residue "hydrate of "protoxide combined with a small portion of nitric acid" is converted into carbonate as above.

Third, lead or "its protoxide" is dissolved in dilute nitric acid with gentle heat, and the oxide precipitated by an alkali or alkaline earth, preferring lime or barytes, as sulphuric acid precipitates them, leaving "dilute nitric acid free to be applied to other useful "purposes;" acetic acid may be used for dissolving the protoxide. The precipitated hydrate is washed, and converted into carbonate as above.

Fourth, protoxide of lead boiled "with oily and fatty bodies" forms "oliates, manganates, and stearates" of the lead oxides, which are decomposed "by an alkali or earth, or their carbonates," a "stream of carbonic acid being applied to the materials under "operation," or dilute sulphuric acid is added to the fatty salts, and on boiling the oxide of lead is precipitated as a sulphate, which is "formed into a carbonate as already described."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 10 (*new series*), p. 108; London Journal (*Newton's*), vol. 13 (*conjoined series*), p. 263.]

A.D. 1838, January 11.—No. 7538.

WATT, Charles, and TEBBUTT, Thomas Rainforth.—"Certain improvements in the manufacture of the hydrate and "carbonate of soda from the chloride of sodium, applicable to the "making of soap, glass, and other useful purposes." These are first, "chloride of sodium (common salt)" is put into a fire brick oven, and a certain quantity of nitric or nitrous added, diluted or otherwise, and with or without "protoxide of manganese, lead, "or chromic acid," all in certain proportions; gentle heat is applied, the chlorine liberated is passed into "apparatus com-"monly used in forming the chlorides." When a small portion of the material dissolved in water gives no white precipitate, the chloride is all decomposed, and "no more nitric acid, &c." is needed. "If any nitric acid is retained in the soda," it is removed by heating it to a red heat with a little charcoal.

Second, "decomposing common salt" by heating it with the nitrates of barytes, lead, &c. using no dilution. The proportions are given; the ovens are gradually heated; the materials are tested as above. The soda resulting is to be purified "by dis-"solving it in water." "The oxides of lead, manganese, &c. will "easily separate and subside," "but the chromic acid will com-"bine with the soda," and is separated by adding "slacked lime "or pure barytes," "until the liquid becomes quite colorless." The solution of soda is evaporated or converted into carbonate or bicarbonate by passing carbonic acid into it.

Third, chloride of sodium is dissolved and boiled in an equal weight of "protoxide of lead or hydrated protoxide," until the test, as before applied, shows perfect decomposition of the salt.

Fourth, chloride of sodium is decomposed by boiling with a given quantity of pure barytes. The chloride of barium must be allowed to "settle down" before applying the silver test. The protoxide of lead used for decomposing the common salt is prepared from the chloride, see No. 7531, first process.

Fifth, pure barytes is prepared by boiling it with chloride of sodium. The chloride of barium thus formed is again boiled with protoxide of lead until the silver test shows perfect decomposition. The chloride of lead again is deprived of its chlorine as described, see first process, 7531.

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 13 (*conjoined series*), p. 339; Patent Journal, vol. 10, p. 213.]

A.D. 1838, January 30.—N° 7555.

FLUDE, Charles.—" Improvements in applying heat to the " manufacture of alkalies and salts, and for smelting and other- " wise working ores, metals, and earths." These are, first, " the " application of coke ovens when combined with means for " supplying heated air thereto, or to the flue thereof," to the above purposes. The oven and chamber are each covered in with a nine inch arch, built with fire-bricks, surmounted by three counter arches of common bricks; in the fire arch the bricks are placed on end or lengthwise, but in the three counter arches the bricks are placed on edge, or four inches and a half thick, making what is called a fourteen inch arch together. The object of these counter arches is to retain the heat. The top arch may also be covered with sand or shingle, to confine the heat more effectually.

Second. " The application of a hopper or hoppers to a coke " oven, when applied to the purposes above described." This is an opening with a projecting shelf, in preference of cast iron, made over the oven door or in the side wall.

Third. " The application of coke ovens to salt pans for making " salt, when such ovens are applied in a position not under the " pan, but only to give heat thereto by flues passing under the " pan, whether such application be accompanied or not by the use " of heated air or hoppers."

[Printed, 10*d.* Drawing. See London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 352.]

A.D. 1838, May 8.—N° 7636.

GOSSAGE, William.—" Certain improvements in manufac- " turing sulphuric acid." When iron pyrites are exposed to heat and air a portion of the sulphur is driven off, but leaving " a large " quantity of sulphur combined with iron," which is named " residual sulphuret of iron." This is decomposed in a stone vessel by adding muriatic acid, steam being used " to expel the " last portions of sulphuretted hydrogen gas." The gas is used for manufacturing sulphuric acid. The muriate of iron solution is evaporated and crystallized for the salt. By a Disclaimer or Memorandum of Alteration, enrolled January 3rd, 1840, certain words are to be omitted, but these have no reference to the processes described in the Specification.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 18 (*new series*), p. 44, and p. 54 for Disclaimer; London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 278.]

A.D. 1838, June 22.—Nº 7697.

WILSON, Eliezer Chater.—(*A communication.*)—" Improve-" ments in evaporation." These are, in evaporating solutions of salt, subdividing the same into numerous surfaces and bringing them in contact with currents of dry atmospheric air. This is effected in a quadrangular building with an "inclined roof having " inclined boards or openings" for "the passing away of the " steam and air which is loaded with moisture." In the inside, at the bottom of the roof, are gutters for "receiving any condensed " water from the inner surfaces of the roof and (to) convey it out " of the buiding or chamber." The sea water is to be pumped or otherwise caused to flow from a pipe into a series of angular troughs near the top of the building, and consisting of two boards inclining to each other, allowing such a width apart as to permit cloths between them and also a free flow of the sea water, or other solution of salt, which flowing down the cloths "will be divided " into numerous surfaces," whilst currents of air and heat are made to pass upwards by forcing air through heated tubes. "Or " in place of forcing currents of air against heated surfaces, the " lower part of the building or chamber" may have steam pipes or pipes filled with water, &c., &c. The solution of salt water under operation should, on its descending to the lower part of the building, be received into troughs or gutters from which it may blow into a suitable tank or reservoir. In forcing air through heated tubes a rotary fan is preferred. This process is preferred to be used as a preparatory one, and in making salt from such solutions it is preferred to employ such salt pans as are described in No. 7361.

[Printed, 8*d*. Drawing.]

A.D. 1838, June 27.—Nº 7710.

BENSON, Edward White.—"Certain improvements in the " manufacture of carbonate of lead." These are the application to "any mixture" for the above purpose, "which is not in such " a state of fluidity as to allow of its flowing as a liquid from one

" vessel to another, of machines travelling over such mixture," and " for giving rotatory, reciprocating, or rectineal motion to blades or " other instruments for the purpose of disturbing and renewing " the surfaces of such mixture," in " order to promote or facili- " tate the absorption of carbonic acid gas by such mixture, or " for detaching such mixture from the trays or shelves upon " which it is spread to absorb such gas." The machines run upon railways fixed in the interior of a chamber secured to the trays containing the materials. The agitator, attached to the machines, consists of a shaft with arms radiating from its centre, like the spokes from a common wheel, having narrow blades fixed upon the ends. The agitator is raised or depressed at will. Machines are described as having blades which may be attached to the frames, so that their lower surfaces or ends "shall be in " contact" or nearly so "with the tray or shelf."

[Printed, 10*d*. Drawings.]

A.D. 1838, June 30.—N° 7713.

DYAR, Harrison Grey, and HEMMING, John.—" Improve- " ments in the manufacture of carbonate of soda." These are, first, to a saturated solution of chloride of sodium (common salt), adding a certain quantity of carbonate of ammonia in powder, " agitating them from time to time;" in from 10 to 20 hours the chemical action is complete. The liquid is drained from the solid matter, which is submitted to a press and afterwards heated for excess of carbonic acid and ammonia, "from about " 600° to 800° of F." The substance left is " the carbonate of " soda," the volatile matters are collected.

Second. To separate the carbonate of ammonia remaining in the solution drained from the solid, it is distilled into a proper condenser "filled with carbonic acid," or muriate of lime is added until a precipitate, "chiefly carbonate of lime, ceases to fall." The precipitate is separated, and the solution evaporated to crystallization of the common salt which may remain in it, and which may be removed or not. The residue is brought carefully to dryness and mixed with chalk, and the carbonate of ammonia sublimed by heat into proper vessels.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 12 (*new series*), p. 159; London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 400; Patent Journal, vol. 10, p. 214.]

A.D. 1838, July 14.—Nº 7736.

SEWELL, Thomas Robert.—"Certain improvements in manu-"facturing white lead." Those are, first, making "an oxide of "lead," "more suitable for conversion into white lead" than "litharge and massicot." "Partially oxidized lead" is heated gently with stirring in an oven "for about three or four hours;" by this means the materials are not converted "into red lead," but into a "state of protoxide of lead," the oxide required, which is cooled out of the atmosphere.

Second. Producing a "superior quality of white lead" with more metallic lead in it than when "carbonate of lead" is "pro-"duced by the ordinary modes of precipitation." This is effected by adding to neutralization carbonates of "potash, soda, or am-"monia" to a solution of the basic salts of lead, or by passing carbonic acid gas through "a mixture of oxide of lead in acetic "acid or acetate of lead," or through solutions of the basic salts, with agitation, until there is an acid reaction on blue litmus paper.

Third. Obtaining carbonic acid "better adapted" for the above purpose than that evolved in the combustion of "carbonaceous "matters in atmospheric air." This is effected by heating to bright red "charcoal, coke dust, or any other similar carbonaceous "matters" with the sulphates of lime, barytes, or strontia, or with carbonate of lime ground and mixed together in certain proportions, collecting, &c. the gas. Or charcoal or coke, &c., "in small pieces" in an earthen retort, is heated to bright red, while steam is passed through the materials and the gas collected.

Fourth. "Improved mode of washing white lead." The white lead is put into a strong iron vessel lined with copper, upon a filtering material resting upon a perforated plate, at the back of which is a passage from which are tubes for carrying off the water. "The "vessel is supported in its frame by hollow axles," one of which is plugged, while a pipe into the other conveys water upon the lead, and forces it through it and the filtering material until it is washed; but any vessel "may be employed if capable of washing "the white lead under pneumatic or hydrostatic pressure."

[Printed, 8*d*. Drawing. Repertory of Arts, vol. 15 (*new series*), p. 200 London Journal (*Newton's*), vol. 15 (*conjoined series*), p. 141.]

A.D. 1838, July 26.—Nº 7748.

CROLL, Alexander.—Improvements in the manufacture of gas for the purpose of affording light. First, the gas is passed through a solution of a nitrate, soda or potash are named, until "the solution has become saturated," ascertained by a piece of red litmus paper becoming blue when held in a stream of the gas. The action is, "hydrosulphuret of soda and nitrate of ammonia," are formed from the sulphuretted hydrogen and ammonia in the gas acting on the nitrate.

Second, recovering the nitrate to be again used by one of the three following processes. 1st. The liquor is put into a still and "the ammonia is distilled over with the sulphuretted hydrogen" in an acid and "chrystallize" the salt, "in the still is nitrate of "soda." 2nd, "supposing nitrate of potash to be the salt" used, the liquor is saturated with an acid, as for instance muriatic acid, sulphuretted hydrogen is evolved, muriate of ammonia and nitrate of potash are formed and are separated by "chrystal-"lization." 3rd, when the salt "may have become so valueless "as not to be worth the value of conversion," the liquor is mixed in a close vessel with slacked lime, heat applied and the ammonia evolved received in a "vessel containing muriatic or other acid."

Third, "affording to the sulphuretted hydrogen" a "suffi-"cient quantity of oxygen" to "render the sulphuretted hydro-"gen into sulphurous acid, and also to decompose the ammonia "as well as to increase the volume of gas," preferring to use for this purpose nitric acid diluted to a certain strength, used in the same way as in "the wet lime process" in leaden vessels, afterwards passing the gas through "the usual lime purifiers."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 12 (*new series*), p. 355.]

A.D. 1838, August 1.—N° 7756.

HEARD, Edward.—"Certain improvements in oxidizing lead "and converting the same into pigments or white and red lead, and "manufacturing part of the products arising from these processes "into soda." Lead is melted in a reverberatory furnace, with a certain quantity of nitrate of soda thrown in, "in small quan-"tities at a time," with stirring. In the course of a few hours, when the lead resembles "in colour litharge," the charge is withdrawn, and when cold ground to a fine powder. When intended for making white lead it is "mixed with water to about the con-"sistence of thick cream," and carbonic acid gas passed into it in a close vessel "until the protoxide of lead is converted into

" carbonate," which is well washed and the solution " evapo-" rated to dryness," affords " a mixture of sub-carbonated and " nitrate of soda," which " may be used again two or three times " successively when thus re-covered with fresh portions of lead." When the last portions of nitrate are decomposed, it is heated with carbonaceous matter, lixiviated, and the solutions evaporated to dryness or crystallized into carbonate of soda. When " red " lead " is required, the first product ground fine and washed yields protoxide of lead, which is " removed into a red lead fur-" nace, such as are in common use, and there finished in the " usual manner."

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 41.]

A.D. 1838, August 31.—N° 7793.

KEYS, JOHN, and CLOUGH, WILLIAM THOMPSON.—" A " method for the manufacture of sulphuric acid from copper ore, " copper regulus, and sulphuret of zinc." These sulphurets are heated to redness in an iron vessel or plate, or by any of the methods at present used " by makers of sulphuric acid from the " sulphuret of iron or iron pyrites ;" the vapours are conveyed into a sulphuric acid chamber or chambers along with nitrous gas.

[Printed, 4*d*. No Drawings.]

A.D. 1838, September 13.—N° 7804.

HALL, JOSEPH.—" Improvements in the manufacture of salt." These are, first, a moving pan revolving " on a pivot from the " centre," and passing " over the fire, which imparts a regular " heat to the whole of the pan, and equalizes its wear and tear." " The pan is supported by a flanch attached to its edge all round, " to which friction rollers are fastened, passing through a water " lute joint, the trough of which is fixed " " immediately under " the periphery of the pan." " If the above be used as a " covered pan " it is constructed " with a pocket all round the " circumference of the pan into which the salt may be raked by " means of a scraper or scrapers affixed to bars attached to a " fixed vertical shaft passing through the cover of the pan."

Second. " Pans having a semicircular form, or that of any

" other portional part of a circle, having a pocket or receptacle " for the salt formed on its straight side (diameter or radius), " into which the salt is moved by a scraper or scrapers working " with a reciprocating motion from a vertical shaft placed in the " middle of such straight side."

Third. " Apparatus by which the pan scratch formed in that " part of the pan more immediately over the fire," is removed without " knocking off the scales with hammers." This is effected " by a frame or frames to traverse over the surface of " the pan bottom," loaded with hard material " to rub off the " pan scratch so often as may be found convenient."

Fourth. " Preparing the brine in a vessel having separate and " distinct fires from the one in which it is converted into salt, " and in which separate vessel the brine can be raised to the " 'boiling' point, purified by raising and taking off the scum," allowed to remain to precipitate earthy matters, when it is " run " off into pans or vessels usually employed in making salt."

Fifth. " Placing a thin stratum of" the easily fusible " compound of lead, tin, and bismuth on those parts of the bottoms " of salt pans most exposed to the action of the fire."

Sixth. " Making that part of salt pans immediately over the " fires more shallow than the remaining part of the pan," so that only a small quantity of brine need be run off to expose the part that requires picking.

Seventh. " A method of supplying at intervals fuel to the " furnaces of vessels employed in the manufacture of salt." A box is placed in front of the fire-place, surmounted by a hopper, fuel is delivered from the hopper by means of a cylinder with a groove on its surface in the direction of its axis, driven by a strap working on a pulley, on to a plate which works on pivots at the end nearest the fire-place, and by an arrangement this plate is suddenly raised, " which thus spreads the fuel it has " received from the cylinder upon the surface of the grate."

Eighth. " constructing a second or false bottom " over " the " whole or part of a salt pan," placing in such bottom " water, " or any other liquid boiling at a higher temperature than water," or by the fusible compound described under the fifth head.

Ninth. " Perforated grate bars for the furnaces of salt pans, " through which a current " of air is allowed to pass.

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1838, October 11.—N° 7830.

WOOLRICH, John.—" In improved process for manufacturing " carbonate of lead, commonly called white lead." " Forming, " from the friction of the ordinary lead of commerce," moistened " with a solution of protoxide of lead dissolved in dilute acetic " acid " to neutralization, and the solution of a certain gravity, or " a solution of protoxide of lead dissolved in dilute nitric " acid," or a solution of acetate of lead, or a solution of carbonate of potash or of soda, or a solution of dilute acetic acid, or dilute nitric acid, but the first solution is preferred, a product convertible into white lead or carbonate of lead by " passing carbonic " acid *gas* through such product and fluid," then separating and drying the " carbonate of lead or white lead." The lead is made into small pieces by passing it while melted through a metallic sieve into water. The vessel with the pieces of lead moistened as above, is made to revolve, and in about every twelve hours the material gradually formed is washed out by a jet of the above solution " mixed with water."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 11 (*new series*), p. 359; London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 168; also vol. 16 (*conjoined series*), p. 230.]

A.D. 1838, October 16.—N° 7831.

FOWLER, John.—" Certain improvements in preparing or " manufacturing sulphuric acid." These are first, sulphate of potash or of soda is heated in a vessel at a high temperature, when mixed with small pieces of coke, and steam passed through the materials at the same time; the result is said to be a carbonate of the alkali and sulphuretted hydrogen, which is evolved and is used for the above purpose.

Second, sulphate of potash or of soda are converted into sulphuret, by mixing them with a certain proportion of coke and calcining them, the carbonic acid evolved is used, the sulphuret formed is broken up in water and submitted to the action of carbonic acid, sulphuretted hydrogen is evolved, and carbonate of the alkali is in solution.

Third, sulphate of potash or of soda is mixed with powdered coke and metallic iron in a divided state, in certain proportions, and exposed to a red heat. The result is said to be sulphuret of iron and carbonate of the alkali. The alkali is washed out of the sulphuret of iron, which is decomposed for sulphuretted hydrogen by the addition of " muriatic or sulphuric acid."

Fourth, sulphate of lime is mixed with powdered coke in certain proportions and heated at a red heat, the result is sulphuret of calcium, carbonic acid gas being evolved. The sulphuret is decomposed "by the action of muriatic acid or carbonic acid " and water." The sulphurets when decomposed by carbonic acid are spread on perforated trays like as in dry lime purifiers, the gas passing upwards through a series of trays. The sulphurets are moistened, or steam is passed in along with the carbonic acid.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 11 (*new series*), p. 350.]

A.D. 1838, November 3.—N° 7843.

BURY, Abraham.—" Certain improvements in the mode of " printing, colouring, or dyeing cotton or other fabrics, and in " the mode of producing certain acid or acids applicable to these " or other purposes." The matter relating to this subject it is said " applies to that part of the production of sulphuric acid, " known as concentration," and consists in boiling or evaporating it in vacuo. To the retort or vessel a close chamber or condenser is attached surrounded with cold water, to which is attached "an " air-exhausting apparatus of any known kind."

By a Disclaimer, enrolled May 3rd, 1839, "the words 'or acids' " in the title are disclaimed, as it is doubtful" whether the above process "is applicable to more than one kind of acid."

[Printed, 10*d*. Drawing. London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 477, for Disclaimer (with Disclaimer).]

A.D. 1838, November 3.—N° 7846.

CORY, Horace.—" Improvements in the manufacture of white " lead." These are first, "the combining of the process of " making white lead with the process of making lime, where- " by the carbonic acid gas evolved in the latter process is " beneficially applied in place of permitting it to pass into the " atmosphere."

Second, " the mode of submitting suitable solutions of lead " to the action of carbonic acid gas."

The gas is brought from the top of the shaft of a lime-kiln by a pipe into a chamber "divided into several compartments by "partitions," which are so arranged as to cause the gas to take a circuitous route before it arrives "at the point," where there is an opening into the atmosphere. There is a vat at the upper part of the chamber where the gas enters, which is filled by a pump, from a vat of the lead solution; "by which means a constant supply of the solution of lead is poured incessantly into "the chamber." There are vats for finishing, &c., the white lead.

[Printed, 1*s*. 10*d*. Drawings. Repertory of Arts, vol. 12 (*new series*), p. 234.]

A.D. 1838, November 13.—Nº 7873.

SAMUEL, Edward.—"Improvements in the manufacture of "soda." These are, first, sulphate of barytes and "sulphate of "strontites," are each mixed with a certain proportion of coal or coke, and roasted at a red heat for some hours, sulphuret of barium and sulphuret of strontium are formed and are dissolved in water and each added to a solution of sulphate of soda in certain proportions, sulphate of barytes and sulphate of strontia are precipitated, leaving in both cases sulphuret of sodium in solution by passing streams of carbonic acid gas through these solutions, and evaporating the "subcarbonate of soda" remains.

Second, solutions of the sulphurets of barium and of strontium are boiled with a metallic oxide, oxide of copper preferred, and in certain proportions, by which means they are converted into solutions of their hydrates, when follow out the process as above.

Third, adding together a saturated solution of oxalic acid and of chloride of sodium. "The greater part of the soda is thrown "down as an oxalate or a binoxalate of soda." The "oxalate "or binoxolate" is either exposed to a red heat, the result is carbonate of soda, or else mixed and boiled with a sufficient quantity of chalk and water, oxalate of lime is precipitated, the solution evaporated, carbonate of soda is the result.

"The oxalate of lime is to be decomposed with sulphuric acid, "and the resulting oxalic acid used for another operation."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 12 (*new series*), p. 98 London Journal (*Newton's*), vol. 15 (*conjoined series*), p. 291; Patent Journal, vol. 10, p. 214.]

A.D. 1838, November 20.—Nº 7877.

WATSON, William, junior.—" Certain improvements in the " manufacture of liquid ammonia, by which the same may be " made applicable to the purposes of dyeing, scouring, and other " manufacturing purposes." " Hitherto," ammonia has generally been combined with an acid, the gas or other liquor evaporated, the salt of ammonia crystallized out, " and put into a retort or " boiler with fresh slaked lime," and the gaseous ammonia evolved on heating is absorbed in water. This process is to dispense with the use of acids and crystallization. The gas liquor is distilled at once with fresh slaked lime, the portion coming over first is separated from the second portion, which is returned into the retort with the next charge. The first portion is re-distilled with or without a small quantity of lime into two portions, the first portion " is a solution of ammonia sufficiently " pure for common purposes ; " " it may be still further purified " by distilling it a third time."

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 15 (*conjoined series*) p. 149.]

A.D. 1838, November 22.—Nº 7879.

WILSON, John.—" Certain improvements in the process of " manufacturing alkali from common salt." These are, first, " to effect the decomposition of common salt without the dis- " engagement of muriatic gas."

Second, " to obtain a neutral sulphate of soda without the loss " of sulphuric acid."

Third, " to recover the sulphur in the form of sulphuretted " hydrogen, when the sulphate of soda is decomposed to procure " alkali."

The above objects are effected as follows :—To a boiling saturated solution of protosulphate of iron, salt, in preference " the " fine grained," is added in certain proportions, and the whole boiled " for about a quarter of an hour ;" the anhydrous sulphate of soda, in crystals, falls down from the chloride of iron solution, the crystals are collected, and washed " with a hot saturated solu- " tion of common salt, which removes any chloride of iron which " may remain in the sulphate of soda." The sulphate of soda obtained as above is converted into sulphuret of sodium by heating it with carbonaceous matter in a reverberatory furnace, and lixiviating the product with water. The chloride of iron solution is next decomposed by adding to it cream of lime, avoiding an excess of lime, and the hydrated protoxide of iron is washed from the chloride of calcium. The hydrated protoxide of iron is added to the solution of sulphuret of sodium obtained above, assisting the action by passing steam into the mixture, sulphuret of iron is formed, and the solution of soda is separated. The sulphuret of iron is treated with sulphuric acid, and the sulphuretted hydrogen evolved collected, for afterwards converting into sulphuric acid. The solution of sulphate of iron is concentrated, to be again employed as above. "When the proto-carbonate of iron is employed" in place of the oxide, it is obtained by "decomposing the proto-" chloride of iron," by boiling it "with powdered chalk," and acting on the solution of sulphuret of sodium with it, the result is "carbonate of soda and protosulphuret of iron." In employing "protosulphate of manganese to decompose common salt," proceeding "in every respect as above." In using the "residuary "sulphates of manganese and soda" from making chlorine, the excess of sulphuric acid is neutralized by boiling with hydrated protoxide of manganese, evaporating to saturation, and adding the salt in "fine crystals or powder." The sulphate of soda may be converted into sulphuret of sodium, which may be decomposed "by the hydrated oxide of iron or of manganese," or by heating it "with slack and limestone."

In employing "sulphate of magnesia to decompose common "salt," it is used as in the former process.

When the sulphate of lime is used to decompose common salt, sulphate of lime, carbonate of magnesia, and common salt, all in certain proportions, are boiled together by steam into the mixture. The reaction is, "carbonate of lime is formed, which precipitates, "and the supernatant solution when concentrated yields anhy-"drous sulphate of soda and solution of chloride of magnesium;" lime decomposes the chloride into hydrated magnesia, which is converted into carbonate "by passing into it a current of carbonic "acid gas."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 12 (*new series*), p. 38.]

A.D. 1838, December 6.—N° 7895.

CHISHOLM, JOHN, and BELLEMOIS, MARIN HYPPOLITE.—"Improvements in treating massicott, litharge, and other com-

" pounds of lead for the purpose of obtaining therefrom silver " and certain other products." These are as follows:—First, lead " which is considered too poor of silver to repay the expence of " separation, should be converted into litharge, in which state the " silver will be retained mechanically. Such litharge should be " preferred in manufacturing the products hereafter described, " but any litharge may be used, as the usual desilverizing operation seldom completely separates the silver from the lead." " By dissolving the oxides of lead (by preference litharge in water " with acetic acid or acetate of lead) " the solution is a basic acetate of lead, " and the residuum, trifling in quantity in proportion to the litharge used, consists of a few insoluble impurities " together with all the silver the litharge will have contained," and from which the silver " may be obtained by well-known " processes."

Second. " Heretofore solutions of acetate of lead have been " used and submitted to the action of carbonic acid gas in the " cold state, and unaided by artificial heat. The application of " artificial heat not only for making the solution, but also during " the action of carbonic acid gas has been found to be a material " improvement in the process of making white lead (carbonate of " lead) by precipitation from solutions of lead dissolved by acetate " of lead or acetic acid." The temperature preferred " is about " 165° F. or 60° Reaumer." The strength of the solution about 30 lbs. acetate or the equivalent of lead and acetic acid, 63 lbs. litharge, 400 lbs. water, but it is not necessary to adhere to these proportions, and " artificial heat may also be advantageously employed whatever acid is employed, as the solvent, when the " process for obtaining the insoluble products is pursued. But " no claim is made for the application of artificial heat when " making carbonate of lead from the solution when nitric acid or nitrate of lead is used " as the solvent of litharge massicott, &c.

[Printed, 4*d*. No Drawings.]

A.D. 1838, December 6.—N° 7898.

NEVILLE, FREDERICK.—(*A communication.*)—" An improved " method or process of manufacturing coke, whereby the sal " ammoniac, bitumen, gases, and other residuous products of " coal are at the same time separately collected, and the heat " employed in the process is applied to other useful purposes."

This invention consists, first, in placing any convenient number of gas retorts, which may be of the ordinary form, over a coking oven in such a manner that the waste heat from the oven will generate the gas and other products from the fuel contained in the retorts. The products from the retorts may then be carried off by means of pipes in the usual manner. Six retorts may be suitably placed over one oven, supported by flat arches, or at each end by resting on the walls.

Second. Relates to the application of the waste heat from coke ovens, for the purpose of heating "small coal" contained in a suitable oven till it becomes "half melted, or in a spungy or pulpy " state," then in conveying this to suitable moulds in which it is compressed, and thereby becomes solidified, and rendered more useful for domestic and manufacturing purposes.

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1839, January 19.—N° 7942.

BARRATT, Oglethorpe Wakelin.—"Certain improvements " in the process of decomposing muriate of soda for the manu- " facture of mineral alkali and other valuable products." Common salt in solution and sulphuric acid are mixed together in certain proportions, and pieces of metallic zinc, also in certain proportions, are added; the hydrogen gas evolved is collected, and burned for "light or heat." The sulphate of soda crystallizes, and the supernatant liquid evaporated on cooling yields a further portion of sulphate. Some of the muriatic acid gas may be collected from a mixture of common salt and sulphuric acid, and the zinc afterwards added to complete the decomposition. The solution of chloride of zinc is decomposed by an agent, cream of lime preferred, and the oxide of zinc is washed.

This oxide, or "native carbonate of zinc, and also sulphate of " zinc may be used, instead of metallic zinc," but not with so much advantage.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 18 (*new series*), p. 160; London Journal (*Newton's*), vol. 15 (*conjoined series*), p. 87.]

A.D. 1839, February 8.—N° 7963.

BINKS, Christopher.—"Certain improvements in obtaining " or manufacturing, and in rendering useful chlorine, the chlorides

" of lime, and soda and other compounds of chlorine applicable " to bleaching." These are, first, to recover the oxide of manganese existing in the residues in manufacturing chlorine.

Second, "to produce sulphurous acid or hydrosulphuric acid " from the sulphuret of manganese obtained as a waste product " by the process commonly used to extract the soda from the said " chlorine residue."

Third, "to manufacture chlorine without the agency of oxide " of manganese," by applying " nitrate of soda or carbonic acid " to decompose " muriatic acid, or muriatic acid gas."

Chlorine "is obtained by heating a mixture of common salt, " black oxide of manganese, and sulphuric acid diluted " with water. The residue is named the *sulphate residue.*" This is treated in four different ways to recover the oxide from it, as follows:—

1st. To a solution of the residue in water, caustic or carbonate of soda is added, the precipitate is washed from the sulphate and heated, in preference, in a reverberatory furnace, admitting air freely. Or the " sulphate residue," dry, is mixed with the " caustic or carbonate of soda," dry, and heated in a reverberatory furnace, and the sulphate of soda washed from the oxide. The oxide or oxides may be further submitted to a "*peroxidizing process,*" afterwards described.

2nd. To a solution of the residue in water, adding a solution of sulphuret of sodium, treating the sulphuret of manganese by a process afterwards described for "*sulphuret residue.*"

3rd. The dry residue is mixed with hydrate of lime in certain proportions, and exposed to a low red heat. There is formed " oxide " of manganese, sulphate of soda, and sulphate and hyposulphate " of lime." The soda, salt, and hyposulphate of lime are washed away, leaving the oxide mixed with sulphate of lime, in which state it may be used; or it may be submitted to a "*peroxidizing process*" afterwards described, sometimes separating a portion of the oxide, which is lighter, from the sulphate of lime by the mechanical action of water. Adding to the sulphate residue common salt in certain proportions, bringing the whole to fusion in a reverberatory furnace, then adding " lime or hydrate of lime," or carbonate of lime, and proceeding as before described. Also using cream of lime, either of the hydrate or carbonate, mixing it with the liquid sulphate residue. The precipitated oxide or carbonate of manganese and sulphate of lime is separated and heated as above. Sometimes fusing the sulphate residue with a certain proportion of common salt, afterwards adding "the cream of lime, " as already described."

4th. "Sulphate residue" and nitrate of soda, and in preference some inferior oxide of manganese or carbonate are mixed together in certain proportions, and heated in a retort to a low red heat; the "binoxide of nitrogen evolved as gas is in preference " brought in contact with an additional quantity of either inferior " oxide" or "carbonate of manganese." The sulphate of soda is washed from the oxide of manganese. The process is varied by adding to the "nitrate of soda and sulphate residue," "lime " or hydrate of lime, or chalk," applying heat to effect their decomposition as above described.

Chlorine is obtained by heating a mixture of muriatic acid and oxide of manganese; the residue is named "*muriate residue.*" This is treated in two different ways, so as to recover the oxide from it, as follows:—

1st. In preference a solution of the "muriatic residue" is mixed with cream of chalk in certain proportions; the carbonate of manganese is washed and treated as above for the oxide.

2nd. "Muriate residue" alone is heated for a lengthened period at a low red heat in a reverberatory furnace. The resulting oxide "can be used in the manufacture of chlorine," or it may be first improved by heating with nitrate of soda, or by passing binoxide of nitrogen through it, or by a "*peroxidizing process.*"

3rd. The "sulphuret residue" named under the second head is treated with hydrochloric acid. The sulphuretted hydrogen evolved is used in some way; in preference burned for sulphurous acid, and the chloride treated as above for the oxide. Sulphuric acid may be used in place of hydrochloric, and the sulphate treated as above for the oxide. The oxide may also be produced from it by keeping it exposed for a long time to "a red heat in a rever- " beratory furnace." The "*peroxidizing processes*" are as follows:—Treating the oxides with sulphuric or hydrochloric acid of a certain strength and in certain proportions. The "hydrated " peroxide of manganese" is separated from the chloride or sul- " phate, whichever acid may have been used. Another method of peroxidizing is to heat the oxide mixed with an excess of carbonate of soda in a reverberatory furnace to a degree "little short

" of that required to fuse the mixture," washing out the soda salt, which may be used again for the same purpose. Nitrate of soda is decomposed " by heating it to a low red heat in an iron retort." The gases evolved are " oxygen and nitrogen ; " these are passed into a gasometer, and from thence pass through " a red hot porce- " lain or earthenware tube," called the " decomposing tube," along with muriatic acid gas ; the result is " chlorine, nitrogen " gas, and water." The proportions in which the above gases are preferred to be mixed before passing through the tube are given. Carbonic acid gas may be substituted for the " oxygen " and nitrogen." The proportions of carbonic acid and muriatic gas preferred are given.

[Printed, 6*d*. No Drawings.]

A.D. 1839, February 11.—N° 7964.

DE SUARCE, CHARLES GABRIEL BARON, and PONTIFEX, WILLIAM.—" A new mode of obtaining dyes, colours, tannin, " and acids from vegetable substances."—" By placing sub- " stances " which yield the above matters in an apparatus " in a " finely divided state, and forcing water or other suitable fluids " through them at suitable temperatures." The apparatus described resembles a tincture press, but having a false perforated bottom, beneath which is a chamber into which liquid is forced by a pump. The materials to be acted upon are placed upon the perforated bottom, and are pressed upon it by a perforated cover held upon them by a screw like as in a tincture press. At the end of the chamber opposite to the entrance of the liquid is " an air " vessel with a safety valve," the " former to keep up an equal " and constant flow of water or other fluid from the force pump, " and the latter to regulate the amount of pressure." " If you " place a Sicily schumack " in the press, and " force water " through it at a temperature of about 190° of Fah., tannin and " gallic acid will be produced, mixed with water."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 12 (*new series*), p. 95; Inventors' Advocate, vol. 3, p. 404.]

A.D. 1839, February 28.—N° 7985.

LEIGH, JOHN.—" An improved mode of obtaining carbonate of " lead, commonly called white lead." This consists, first, in

" the mode of making nitrate of lead from galena and dilute " nitric acid." The galena is ground and "nitric acid of sp. gr. " 1·3, diluted with three or four times its bulk of water" is added to it in certain proportions, and a gentle heat applied.

Second, " the mode of decomposing the chloride, sulphate, " nitrate, or acetate of lead by the purified gas liquor, or the " purified liquor from distilled wine, or the purified matters from " distilled bones and other animal substances." These substances are added gradually with stirring in a vessel which may be closed, to the salts of lead, and the whole exposed for many hours in shallow vessels. The mixed carbonate and hydrate formed is well washed, and carbonic acid passed into it, " to convert it into a " perfect carbonate."

Third. " The method of decomposing sulphate or chloride of " lead by a solution of sesquicarbonate or bicarbonate of ammonia, " whereby the use of gaseous carbonic acid is rendered unneces- " sary." This consists in adding, as above, solutions of the salts of ammonia to the salts of lead, in certain proportions.

Fourth, purifying the gas liquor employed by adding to the concentrated distilled liquor in preference carbonate of lead in fine powder, " so long as any blackness is produced," and the liquid may be redistilled. The other liquors are purified much in the same manner.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 14 (*new series*), p. 103; London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 275; Inventors' Advocate, vol. 1, p. 50.]

A.D. 1839, March 8.—N° 7998.

FORD, EDWARD.—" Certain improvements in conducting the " manufacture of salt cake or sulphate of soda, and hydrochloric " or other acids, and alkalies or other chemical processes wherein " deleterious vapours are given off, and in the erection of furnaces " and works connected therewith."

These " consist in removing the furnaces and other works, " whereby such chemical processes " " shall be sufficiently re- " moved from land " as not to affect vegetation. For this purpose a vessel or flotilla is erected upon the sea or such rivers as are " available for the purpose." These vessels are lined with lead, at least at certain parts.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 18 (*new series*), p. 156; London Journal (*Newton's*), vol. 15 (*conjoined series*), p. 229; Inventors' Advocate, vol. 1, p. 83.]

A.D. 1839, March 14.—N° 8000.

GAMBLE, Josias Christopher.—" Improvements in apparatus for the manufacture of sulphate of soda, muriatic acid, " chlorine, and chlorides." These are, first, " iron retorts worked " in connection with each other." Two decomposing furnaces are connected to a roasting furnace.

Second, the *iron retorts constantly worked through a door, open, or partly open while the process is going forward, the draft of the chimney drawing in a portion of the external air with the muriatic acid into the receivers.*

Third, " the use of receivers so arranged that the acid can pass " from one to the other, or can be cut off at pleasure when strong " acid is required ;" these are " filled with glass or pebbles."

Fourth, the use of " earthen stills with leaden heads, incased " in iron heated by the circulation of hot water, saline solutions, " or by steam."

Fifth, " the mode of charging the lime receivers, by which lime, " already in part saturated with chlorine, is exposed to the " strongest gas, and the remnant of gas is exposed to a surface of " fresh lime."

By a Disclaimer enrolled January 3rd, 1845, the part above printed in italics is disclaimed on the ground that the words have a doubtful meaning.

[Printed, 1*s*. 2*d*. Drawings. Repertory of Arts, vol. 12 (*new series*), p. 139; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 136; also vol. 29 (*conjoined series*), p. 57; Inventors' Advocate, vol. 3, p. 404; Common Bench Reports, vol. 3, p. 425; Law Times, vol. 7, p. 431; also vol. 8, p. 9 (with Disclaimer).]

A.D. 1839, March 20.—N° 8007.

LAW, Edward.—" Certain improvements in evaporating sea water or other fluids, and in the manufacture of salt." These are exposing the liquids " on an extensive surface to the action of a " brisk current of atmospheric air by means of horizontal machines " which can be easily turned and put into rapid circulation, or " by means of the currents so produced." A machine is described consisting of an upright shaft or axis, carrying ten frames, upon which are sheets or wings of strong canvas, or other suitable material. Parallel with these arms are ten pipes " with holes on " their under sides." These pipes are supplied by a central funnel, which is supplied by means of a pipe connected with a tank. This machine turns on pivots. There are other modifications of the above.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 18 (*new series*), p. 201; Inventors' Advocate, vol. 1, p. 115.]

A.D. 1839, April 9.—Nº 8025.

ROEDERER, CHARLES ADOLPHE.—(*Partly a communication.*) —" An improved method or process of manufacturing or pre-" paring the chemical salts called acetates." A vessel not acted upon by acid is employed, at the lower part of which is a " minutely perforated false bottom, or a coiled tube of several " convolutions minutely perforated," to admit the vapour of acetic acid to pass through it; " several perforated diaphragms " are placed at " different degrees of elevation " in the vessel, on each of which are " spread a layer of litharge; the vessel is closed " by a cover, and a pipe or pipes conveys away vapour after the " acid is removed from it by passing through the layers of litharge " on the perforated diaphragms. The acetate of lead " falls to the bottom of the vessel. As the operation draws to a close, to prevent loss of acid the vapours are conducted into a similar vessel prepared in like manner.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 14 (*new series*), p. 140; London Journal (*Newton's*), vol. 17 (*conjoined series*), p. 105; Inventors' Advocate, vol. 1, p. 146.]

A.D. 1839, April 16.—Nº 8033.

ROWE, LAWRENCE.—" Improvements in the manufacture of " the sulphate of soda." In condensing muriatic acid gas it proceeds " by a flue leading from the furnace to the chimney over " a channel, through which the water which has been used in " purifying falls and passes away." This flue ascends to a considerable height, and " descends through a series of alternately " ascending and descending chambers, forming one continued " flue, which in each successive chamber is alternately closed at " the top or at the bottom; water is admitted through a series of " short pipes, at the top of each chamber of the flue."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 12 (*new series*), p. 244; also 13 (*new series*), p. 119; London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 346; Inventors' Advocate, vol. 1, p. 163.]

A.D. 1839, April 16.—N° 8036.

SWINDELLS, John.—" Certain improvements in the manufac-
" ture of prussian blue, prussiate of potash, and prussiate of
" soda." These are, dispensing with the use of " lime or of car-
" bonate of lime," in the above manufacture. " Decomposing
" the sulphates of potash and sulphate of soda by caking coal
" and iron filings, in the manufacture of potash and soda from
" these substances." The sulphates are fused in a reverberatory furnace, and ground coal and iron filings are added in preference by degrees. The mass is cooled, and dissolved, and the prussiates crystallize out in some days.

[Printed, 4*d*. No Drawings. Repertory of Arts vol. 18 (*new series*), p. 158; London Journal (*Newton's*), vol. 17 (*conjoined series*), p. 32; Inventors' Advocate, vol. 1, p. 164.]

A.D. 1839, May 7.—N° 8056.

HUNT, Joseph.—" Improvements in the manufacture of soda and other valuable products from common salt. These are, first,
" the mode of making soda by triturating blue or metallic lead of
" commerce with common salt."

Second, " the treating one product of the first process with
" diluted sulphuric acid, and obtaining a pigment or vehicle for
" colour."

Third, " the treating the one product (with carbonic acid gas)
" to obtain carbonate of lead."

Fourth, " the obtaining soda and other valuable products from
" treating it with zinc."

Zinc, like lead in small pieces is triturated with common salt, with as much exposure to the air as possible.

[Printed, 4*d*. No Drawings. Inventors' Advocate, vol. 1, p. 210.]

A.D. 1839, May 22.—N° 8072.

JEFFERIES, William.—" Certain improvements in the process
" of smelting or extracting metal from copper and other ores."
These are, first, " the use and application of the construction of
" furnaces," as follows :—" Two ovens or roasting chambers are
" connected (together) in one building, but they may be con-
" structed separately, or three, or four, or any other number side
" by side." The furnaces are divided by two horizontal floors or

partitions, the lower floor forming the roof of the ash-pit, "as " well as the floor of the roasting or calcining chamber or oven." This floor is pierced with a number of small apertures for the admission of air from the ash-pits, which are furnished with doors " which may be opened or closed according to the draft required " through the furnaces." The second horizontal floor divides the calcining chambers from the upper or condensing chambers, in which "the vapours become condensed, and the sulphuric acid " and other heavy parts of the vapour may be collected in suitable " vessels, by which the deleterious matters usually thrown off into " the atmosphere will in a great measure be arrested and their " unpleasant consequences prevented," and the uncondensed gases pass off by chimnies in the roof. The smoke and vapour arising from the roasting of the ore is allowed to pass through two apertures in the roof of the calcining chamber. There are doors in the calcining and condensing chamber. There are also two furnaces with one condensing chamber.

Second. Submitting the ore to a slow operation of calcining, by using a small quantity of fuel kept in a state of slow combustion by the regulated admission of air, and after roasting steeping the ore for several days, exposed to the atmosphere, in a mixture of alkali and water.

[Printed, 10*d*. Drawing. Repertory of Arts, vol. 17 (*new series*), p. 213; London Journal (*Newton's*), vol. 15 (*conjoined series*), p. 427; Inventors' Advocate, vol. 1, p. 259.]

A.D. 1839, June 6.—N° 8094.

DYAR, Harrison Grey, and CHISHOLM, John.—" Improvements in obtaining sulphur from pyrites or certain native " sulphurets." These are " decomposing sulphurous acid from " roasted sulphurets by the agency of passing water or steam " into a furnace so arranged as to give free hydrogen, and in " expelling that portion of the sulphur that may be distilled from " the pyrites or bisulphuret of iron without the combustion of the " sulphur by the air feeding the furnace."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 13 (*new series*), p. 267 Inventors' Advocate, vol. 1, p. 275.]

A.D. 1839, July 11.—N° 8149.

DUCLOS, Edward Francois Joseph.—" Improvements in " the manufacture of sulphur, sulphuric acid, and sulphate of

" soda. These are, first, " treating pyrites in order to obtain " sulphur therefrom " " by placing pyrites into retorts " such as are described in N° 7662, with " a tube or eduction pipe leading " from each retort, and dipping into a trough or vessel containing " water."

Second, " bringing sulphurous acid gas and sulphuretted " hydrogen together, and by such means obtain sulphur." These gases are brought together, " in whatever processes they are " separately evolved." The sulphurous acid may be evolved from roasting sulphur ores, the sulphuretted hydrogen from metallic sulphurets by hydrochloric acid, or by passing carbonic acid into the alkaline sulphurets.

Third. The residue from the first process after roasting to convert it into persulphate of iron is distilled in close fire-clay retorts in order to " obtain highly concentrated sulphuric acid," which is condensed.

Fourth. Mixing protosulphate of iron and common salt together, and calcining them; the results are " hydrochloric acid, " peroxide of iron, and sulphate of soda."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 13 (*new series*), p. 90; London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 103; Inventors' Advocate, vol. 2, p. 132.]

A.D. 1839, July 16.—N° 8155.

REYNOLDS, John.—" Certain improvements in the manu- " facture of salt." These are, first, " causing the steam pro- " duced by boiling brine or salt water in a close vessel to transfer " its heat to and thereby boil brine or salt water in a second " closed vessel, so that the steam from such second closed vessel " may in like manner transfer its heat to brine in a third vessel, " and so on, by maintaining in each of a series of closed vessels " in which brine or salt water is subjected to evaporation, such " relative pressure as will cause the respective boiling points of " the brine or salt water contained in each to be lower (or of " successively decreasing temperature) from the first to the last " of the series, so that the steam or vapour produced from the " brine in each vessel may be condensed in a vessel of thin metal " immersed in the brine of the next succeeding vessel, in the " order of decreasing pressures and temperatures, by imparting " its heat (or the greater proportion thereof) to the brine in which

" the condensing vessel is immersed, such graduations of pressure " in the series of vessels being obtained either by diminishing a " pressure superadded to that of the atmosphere, or by diminish- " ing the pressure of the atmosphere in each vessel successively."

Second. " Collecting and discharging salt from the vessels " wherein it is formed." At the bottom of the evaporators are funnels to conduct the salt deposited by the brine into deposit vessels or receptacles attached below.

[Printed, 10*d.* Drawing. Inventors' Advocate, vol. 2, p. 132.]

A.D. 1839, July 20.—N° 8166.

FLUDE, **Charles**.—" Certain improvements in the manufacture " of white lead." These are, first, " converting oxide of lead or " litharge into a solution of sub-acetate of lead." A solution of acetate of lead is introduced into a vessel, and steam is passed into it, and when the solution is heated " oxide of lead or litharge " is then added at intervals, stirring the solution each time " until no more will dissolve.

Second. In the above manufacture, using " steam in combina- " tion with carbonic acid gas," and " injecting the carbonic " gas " into the solution of sub-acetate " by means of reciprocating " hydraulic gasholders."

Third, " the manufacture of white lead from the combination of " lead, or lead in a volatilized state with carbonic acid." The lead is exposed " to a powerful heat in an iron retort or pan," a " blast of air or steam " passing over its surface volatilizes " lead " or its oxide " into " a chamber filled with carbonic acid gas." " The parts of each apparatus only in as far as they are in such " apparatus newly combined and arranged " for the above purpose, are claimed.

[Printed, 10*d.* Drawings. Inventors' Advocate, vol. 2, p. 133.]

A.D. 1839, November 2.—N° 8253.

CROLL, **Alexander Angus**.—" Improvements in the manu- " facture of gas, and in converting the salts used in purifying " gas, and improvements in the manufacture of ammoniacal " salts." These are, first, passing the gas through solutions of chloride of zinc or sulphate of zinc, chloride of magnesium, sulphate of magnesia, chloride of calcium, chloride of barium,

" soda. These are, first, " treating pyrites in order to obtain " sulphur therefrom " " by placing pyrites into retorts " such as are described in N° 7662, with " a tube or eduction pipe leading " from each retort, and dipping into a trough or vessel containing " water."

Second, " bringing sulphurous acid gas and sulphuretted " hydrogen together, and by such means obtain sulphur." These gases are brought together, " in whatever processes they are " separately evolved." The sulphurous acid may be evolved from roasting sulphur ores, the sulphuretted hydrogen from metallic sulphurets by hydrochloric acid, or by passing carbonic acid into the alkaline sulphurets.

Third. The residue from the first process after roasting to convert it into persulphate of iron is distilled in close fire-clay retorts in order to " obtain highly concentrated sulphuric acid," which is condensed.

Fourth. Mixing protosulphate of iron and common salt together, and calcining them; the results are " hydrochloric acid, " peroxide of iron, and sulphate of soda."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 13 (*new series*), p. 90; London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 103; Inventors' Advocate, vol. 2, p. 132.]

A.D. 1839, July 16.—N° 8155.

REYNOLDS, JOHN.—" Certain improvements in the manu-" facture of salt." These are, first, " causing the steam pro-" duced by boiling brine or salt water in a close vessel to transfer " its heat to and thereby boil brine or salt water in a second " closed vessel, so that the steam from such second closed vessel " may in like manner transfer its heat to brine in a third vessel, " and so on, by maintaining in each of a series of closed vessels " in which brine or salt water is subjected to evaporation, such " relative pressure as will cause the respective boiling points of " the brine or salt water contained in each to be lower (or of " successively decreasing temperature) from the first to the last " of the series, so that the steam or vapour produced from the " brine in each vessel may be condensed in a vessel of thin metal " immersed in the brine of the next succeeding vessel, in the " order of decreasing pressures and temperatures, by imparting " its heat (or the greater proportion thereof) to the brine in which

" the condensing vessel is immersed, such graduations of pressure " in the series of vessels being obtained either by diminishing a " pressure superadded to that of the atmosphere, or by diminish- " ing the pressure of the atmosphere in each vessel successively."

Second. " Collecting and discharging salt from the vessels " wherein it is formed." At the bottom of the evaporators are funnels to conduct the salt deposited by the brine into deposit vessels or receptacles attached below.

[Printed, 10*d*. Drawing. Inventors' Advocate, vol. 2, p. 132.]

A.D. 1839, July 20.—N° 8166.

FLUDE, CHARLES.—" Certain improvements in the manufacture " of white lead." These are, first, " converting oxide of lead or " litharge into a solution of sub-acetate of lead." A solution of acetate of lead is introduced into a vessel, and steam is passed into it, and when the solution is heated " oxide of lead or litharge " is then added at intervals, stirring the solution each time " until no more will dissolve.

Second. In the above manufacture, using " steam in combina- " tion with carbonic acid gas," and " injecting the carbonic " gas " into the solution of sub-acetate " by means of reciprocating " hydraulic gasholders."

Third, " the manufacture of white lead from the combination of " lead, or lead in a volatilized state with carbonic acid." The lead is exposed " to a powerful heat in an iron retort or pan," a " blast of air or steam " passing over its surface volatilizes " lead " or its oxide " into " a chamber filled with carbonic acid gas." " The parts of each apparatus only in as far as they are in such " apparatus newly combined and arranged " for the above purpose, are claimed.

[Printed, 10*d*. Drawings. Inventors' Advocate, vol. 2, p. 133.]

A.D. 1839, November 2.—N° 8253.

CROLL, ALEXANDER ANGUS.—" Improvements in the manu- " facture of gas, and in converting the salts used in purifying " gas, and improvements in the manufacture of ammoniacal " salts." These are, first, passing the gas through solutions of chloride of zinc or sulphate of zinc, chloride of magnesium, sulphate of magnesia, chloride of calcium, chloride of barium, until the solution is saturated, ascertained by testing the gas after so passing with red litmus paper. Sulphate of lime may be employed in the dry state. " When the salts of lime, magnesia, " or barytes are used," a portion of carbonic acid gas is added " to " the coal gas before it is passed through these solutions, by which " these salts are converted into insoluble carbonates," while the salt of ammonia formed remains in solution."

Second. " Obtaining the ammoniacal salts from any of the " solutions " by allowing the insoluble matter to settle, and drawing off " the clear liquor which contains the salt of ammonia," and obtaining " that salt by evaporation, either to the point of " chrystallization or to dryness."

Third. " The insoluble matter above mentioned is then to be re-" converted into the original salt by dissolving it in the acid for-" merly combined with its base," or by " muriatic or sulphuric " acid, as it should be desired to form sulphate or muriate of " ammonia in any subsequent operation."

[Printed, 4*d*. No Drawings. Inventors' Advocate, vol. 2, p. 292.]

A.D. 1839, November 16.—Nº 8271.

WIESMANN, William.—" Improvements in the manufacture " of alum." These are to obtain alum particularly free from iron. Potters' clay as free as possible from iron is calcined at a moderate heat, ground to a powder, which is dissolved by sulphuric acid, in preference leaving a little of the clay undissolved; the liquid is brought to dryness, and the salt separated by water; a measured portion of the liquid is tested by prussiate of potash for the oxide of iron, and solution of prussiate of potash added to the whole of the liquid, and the precipitate removed; the liquid is ready for use, or the salt may be crystallized. " Lixivium of " blood or sulphate of lime " may be employed above in place of prussiate of potash.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 14 (*new series*), p. 53; London Journal (*Newton's*), vol. 16 (*conjoined series*), p. 365. Inventors' Advocate, vol. 2, p. 339.]

A.D. 1839, December 4.—Nº 8296. (* *)

CRONIER, Pierre Narcisse.—(*Partly a communication.*)— " Improvements in filters, and in the means of cleansing the " same, and for separating, colouring, and tanning matters

" by filtration, or for improvements in tanning, or employing " tanning matters by filtration."

The filter referred to consists of a " copper case," in the interior of which are placed in series a " sponge ; " a " partition or false " bottom," working tight in the copper case ; " projections on " which the bottom of the sections rest ; " " beds of sand and " stone ; " and empty spaces between the sections of the filter ; " with suitable pipes and taps to supply and take away the liquid from each section. " The water should be supplied from a reser- " voir placed at a certain elevation, and will enter at the upper " open cock, and run out at the lower one in a filtered state." The " copper case " has a tight lid, through which works a rod for the purpose of actuating a " compression plate," and during the cleansing of the filter, which is effected by reversing the direction of the water, this compression plate " should be kept " in motion to express the slime or dirt contained in the sponge." " This invention also consists in using as a filtering medium the " materials from whence the fluid to be filtered is obtained ; for " example, in clarifying wine and vinegar " the Patentee uses the " kernel of apples, or the stone of bruised raisins ; " " for clari- " fying beer, the hop or the grains ;" " oils should be filtered either " by using oil-cake, or by the stone of the olive well bruised," &c. The Patentee also describes his mode of " tanning by filtration."

[Printed, 6*d*. Drawing. See Inventors' Advocate, vol. 2, p. 371.]

A.D. 1839, December 9.—N° 8304.

POOLE, Moses.—(*A communication.*)—" Improvements in the " manufacture of caustic soda and carbonate of soda." These are said to be " the decomposition of sulphuret of sodium by the " protoxide of copper, and in combination with this process the " production of sulphate of ammonia, and also in the conversion " of sulphate of ammonia to the state of sulphate." Common salt is decomposed by sulphate of ammonia, and chloride of ammonium and sulphate of soda are obtained. The sulphate of soda is converted into sulphuret of sodium by heating with charcoal or other carbonaceous matter, and the sulphuret of sodium decomposed by boiling with protoxide of copper. The liquid is evaporated for caustic soda, or saturated with carbonic acid to form carbonate. The sulphuret of copper is calcined in a furnace with a current of air; the sulphurous acid evolved is passed into ammonia, obtained by decomposing the chloride of ammonium first formed with lime. The salt of ammonia thus formed is further exposed to the air, and the "sulphate of ammonia" thus obtained is again "used for decomposing common salt." The deutoxide of copper left on calcining as above is converted into protoxide by heating it with a certain per-centage of "powdered charcoal or "turf coal."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 14 (*new series*), p. 113; London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 189. Inventors' Advocate, vol. 2, p. 404.]

A.D. 1839, December 9.—N° 8305.

RICHARDSON, Thomas.—"A preparation of sulphate of lead "applicable to some of the pueposes for which carbonate of lead "is now applied." Protoxide of lead, in preference "flake "litharge," is put into a tub and is mixed with a certain proportion of strong acetic acid and water, and the whole agitated; after a portion of the oxide is converted into acetate, sulphuric acid in certain proportions is gradually added with stirring, so as to convert all the protoxide into a sulphate, after which it is washed, ground, and dried "in stoves similar to those already in "use."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 14 (*new series*), p. 92; London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 170. Inventors' Advocate, vol. 2, p. 387.]

A.D. 1839, December 13.—N° 8309.

HERVEY, Robert.—"Certain improvements in the mode of "preparing and purifying alum, alumina, aluminous mordants, "and other aluminous combinations and solutions, and the "application of such improvements to the purposes of manufac-"ture." Clay as free as possible from iron, and containing a large quantity of alumina is selected, and dried, ground, sifted, and heated moderately in a reverberatory furnace, and afterwards calcined, and after cooling treated with a certain proportion of oil of vitriol, and the whole lixiviated with water. The solution of sulphate of alumina contains iron, from which it may be freed by adding "prussiate of soda or prussiate of lime, or any other "combination of the prussic or ferroprussic acid sufficient to "precipitate all the iron held in solution." If alum is wanted, potash or sulphate of potash, or ammonia or sulphate of ammonia, or other combinations of these salts are added. "Soda may also "be used, but alum is difficult of formation therewith." To make the mordant known as red liquor, which is acetate of alumina, acetate of lime or lead is added in sufficient quantity for the lime or lead "to unite with and carry down the sulphuric acid of the "sulphate of alumina," leaving in solution acetate of alumina, throwing down the iron from it as before by the prussiate. Alumina is thrown down from the impure sulphate by an alkali or alkaline earth; this is re-dissolved in acetic or pyroligneous acid, and the iron precipitated as before. The "sulphate of "alumina" is also freed from iron by adding to it an alkali or alkaline earth. The precipitate is treated with caustic alkali, which dissolves the alumina, leaving the iron oxide undissolved. The clear solution drawn off and neutralized, the alumina precipitates, and may be sold in that state or may be converted into any of its salts.

[Printed, 4*d.* No Drawings. Repertory of Arts, vol. 16 (*new series*), p. 363; London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 180; Inventors' Advocate, vol. 2, p. 387.]

A.D. 1839, December 24.—N° 8328.

FIRMSTONE, THOMAS.—"Improvements in the manufacture "of salt." These are, first, "the mode of evaporating brine in "the manufacture of salt by means of blasts of heated air passed "over the surface of such brine." The air in preference at 400 F. is heated as in a blasting furnace, the pipe has several small tubes, so that the air is "divided into a series of streams "which sweep over the surface of the brine."

Second. "Constructing circular pans with pockets and scrapers "at right angles to the axis of motion."

Third. "Causing brine to circulate in pans and vessels in the "manufacture of salt." The brine is in a circular pan under which is the fire; from two sides of the pan are channels which connect it with two other pans, which are also connected together by a trunk or way at their ends; in one of the channels in preference is a paddle wheel for causing the brine to circulate in a shallow current over the heated surface of the pan. There is a scraper in the circular pan. A salt pan "is heated by the flue of "the fire or furnace of the circular pan."

[Printed, 1*s.* 4*d.* Drawings. Inventors' Advocate, vol. 3, p. 3.]

A.D. 1840, January 21.—N° 8356.

HUNT, William.—"Improvements in the manufacture of "potash and soda, and their carbonates." These are:—Employing sulphates of copper and of zinc to decompose the alkaline chlorides by digesting them together, sulphate of soda is in solution, and on evaporation crystals of the salt are obtained. The solution of the chloride of the metal, if it is of copper, is decomposed "by means of metallic iron or of lime," and if of zinc by means of lime. When lime is employed it is added to the solution of the muriate as milk of lime, the whole evaporated, and calcined in a reverberatory furnace, and the chloride of calcium is washed from the oxide by water. The oxide is employed "for decom- "posing hydrosulphuret of soda, and producing soda." "Instead "of separating the sulphate of soda from the muriate of copper" as above, metallic copper finely divided is added, and heat applied "until the greater part of the muriate of copper is converted into subchloride of copper, and falls to the bottom of the vessels;" the solution is drawn off, and "the copper remaining therein" is precipitated "by means of iron or hydrosulphuret of soda," and the solution evaporated for sulphate of soda. The subchloride of copper is washed, and decomposed "by means of iron or lime" as above. "Deutoxide of copper" for the above purpose is also obtained by heating finely divided metallic copper in a reverberatory furnace with a current of air passing over it. Muriate of zinc is also decomposed by passing steam over the dry salt heated, muriatic acid is evolved, and oxide of zinc remains mixed with a little muriate, from which it is freed by washing. Sometimes the mixture of sulphate of soda and muriate of zinc is dried and distilled, and the muriate of zinc which distils off condensed. The residue "contains sulphate of soda, oxide of zinc, and muriate "or sulphate of zinc;" water dissolves the soda and zinc salts, leaving the oxide of zinc undissolved; "sulphuret of soda" precipitates the zinc from this solution, leaving on evaporation sulphate of soda. The muriate of zinc above is decomposed by means of lime as above for the oxide. The sulphate of soda may be decomposed into sulphuret by fluxing with powdered coke or coal in a reverberatory furnace; but it is preferred to use a furnace much longer with a fire-place at each end, having a flue through the arch near the centre; a bed of coke or coal, but in preference coke, is spread on the floor of the furnace. Sulphate of soda is introduced "near the upper end of the furnace," and when it becomes fluxed it percolates through the bed, and is decomposed into "sulphuret of sodium mixed with caustic soda, carbonate of "soda, and other matters," which escape through an opening in the side. This product is lixiviated with water, and this solution is "boiled in boilers which are fixed in brickwork in such manner "as to protect the lower part from the fire," and oxide of either zinc or copper added until the sulphuret is completely decomposed. Caustic soda is obtained, and may be converted into carbonate "by causing it to absorb carbonic acid."

"Metallic sulphates, sulphuric acid, and metallic oxides" for the above purposes are obtained as follows, "from the sulphurets "of copper and zinc" obtained as above.

When metallic sulphates are required the sulphurets are heated in what is called "the sulphating furnace" for about twelve hours, with raking, at "a temperature of about 400° F.," a current of air passing over the materials. The product lixiviated with water affords a solution of sulphate of the metal, the residue "contains "oxide and sulphuret." If oxide predominates in it, it may be used for decomposing "hydrosulphuret of soda," as above; but if sulphuret predominates it is returned to "the sulphating "furnace" to be again operated upon. When the sulphate of the metal is employed for making sulphuric acid it is distilled "at a bright red heat" in "what is called the distilling furnace;" a small current of air "passes through the distilling furnace;" "the gases produced pass through a pipe" into sulphuric acid chambers. Sulphuric acid is also obtained "by the use of either "of these sulphurets without previously converting it into sul- "phate;" for this purpose the dry sulphuret is heated to redness in what is "called the furnace of combustion," with a current of air passing through it; the gas passes off as above. The residuum from the "distilling furnace" and the "furnace of com- "bustion" contains "oxide," "sulphate, and subsulphate" of the metal; this residuum is lixiviated with water, and the sulphate extracted "by drawing off the solution," "when there is added to "the residuum hydrosulphuret of soda in sufficient quantity to "decompose the sulphate which it contains," and "thus obtain "a solution of sulphate of soda." Sulphuric acid is also obtained from sulphuret and sulphate of the metals mixed together in certain proportions, this is heated to redness in the "furnace of "combustion," the gas passes off as above, and the residue is treated as above.

In manufacturing potash and its carbonate from muriate, the process is the same as in using muriate of soda to produce soda. When nitrate of potash is used it is decomposed by sulphuric acid, and "thus obtain sulphate of potash and nitric acid." Sulphate of potash is employed for "producing potash and its "carbonate in every way," as described for "producing soda and "its carbonate" from "sulphate of soda."

[Printed, 8*d*. Drawing. London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 115; Inventors' Advocate, vol. 3, p. 132.]

A.D. 1840, January 21.—Nº 8357.

BERRY, MILES.—(*A communication.*)—"Certain improvements "in the manufacture of prussiate of potash and prussiate of soda." These are as follows:—First, the materials are mixed together by means of "an aqueous solvent" as urine, if it can be easily got, if "otherwise use common water" to dissolve the salts, the iron used is dissolved in acid, and the charcoal and all mixed together and dried and pulverized, or the materials are put into a revolving barrel with balls so as to grind them up, the object being to get them as closely combined together as possible. "The compound" ingredients when perfectly dry are introduced "into a series of "pipes connected together, and contained in a furnace similar to "that used for the manufacturing" of gas; the pipes in preference are placed vertically, and when so placed the materials are not pulverized "completely," so that the gases may "circulate "through them without raising the pressure to a dangerous "pitch." "The animal matter is placed in a separate compart- "ment and in a cast-iron retort, which is connected with the "horizontal or vertical tubes." The materials are potash, saltpetre, iron filings, coke or ordinary charcoal, and dried blood, when "an aqueous solvent" is used acetate or nitrate of iron is used in place of the iron filings; the proportions preferred are given. When the gas which issues from the pipes assumes a pink colour in burning, and "becomes smaller and clearer "while a good fire exists under the retort" the process is "near "its end." The charge is "rapidly removed from the retorts, "and it being at a red heat should be thrown at once into water

" to extinguish it rapidly." " Soda being substituted for potash " the result will be prussiate of soda."

[Printed, 6*d.* Drawing. Repertory of Arts, vol. 17 (*new series*), p. 219; London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 96; Inventors' Advocate, vol. 3, p. 68.]

A.D. 1840, February 5.—N° 8374.

COOKSON, William Isaac.—" Certain improved processes " or operations for obtaining copper and other metals from metallic ores." These are, first, distilling " the rich sulphureous " ores " so as to obtain sulphur from them, and " obtaining sulphuretted hydrogen gas by means of this protosulphuret" by adding muriatic or sulphuric acid, which dissolves the iron and leaves " sulphuret of copper and the silver," if any is in the ore.

Second, roasting the " sulphureous ores at a bright red heat," exposed to the air in a furnace employed for making sulphuric acid (N° 4263), until the sulphurets of iron and copper are converted into oxides, dissolving the oxide of copper in muriatic acid, from which solution " metallic copper may be obtained."

Third, roasting the ores as under the second head, but withdrawing the roasted ore when the greater part of the iron ore has been " converted into oxide," and " before any part of the sul-" phuret of copper is converted into oxide ;" it is removed into a furnace and kept at " such a red heat as is just perceptible in the " absence of daylight," a current of " air passing through the " oven or furnace " until the sulphuret of copper is converted into sulphate; washing out the sulphate, and precipitating the copper by iron or the oxide by lime, reducing the oxide with carbon at a high temperature.

Fourth, roasting the ores as under the third head, fluxing the roasted ores with carbonaceous matter, the metals are reduced to protosulphurets; muriatic or sulphuric acid added, sulphuretted hydrogen is obtained, the iron is in solution, and the " sulphuret " of copper and also silver" remain and may be recovered in the metallic state.

Fifth, " the use of muriatic acid and sulphuric acid for facilitating the obtaining copper from the oxide ores.

[Printed, 6*d.* No Drawings. Repertory of Arts, vol. 14 (*new series*), p. 222 also vol. 15 (*new series*), p. 90; Inventors' Advocate, vol. 3, p. 114.]

A.D. 1840, February 12.—N° 8386.

BLANC, Antoine, and BAZILLE, Theophile Gervais.—(*A communication.*)—" Certain improvements in the manufac" turing or producing soda and other articles obtained by or from " the decomposition of common salt or chloride of sodium." These are " decomposing sea salt by silica and water under the " influence of a strong heat." This may be effected in cast-iron cylinders ; a tube passes into each cylinder, and is pierced with many holes for the introduction of steam, and another tube from the cylinder conveys off the muriatic gas into a condensing chamber. " Each cylinder is filled loosely " with " an intimate " mixture of sea-salt and sand ; " heat is applied all round the cylinders to " raise them to a cherry red heat," when the steam is gradually turned on. When the decomposition of the sea-salt is completed, the result is washed to remove any undecomposed salt, and the " neutral silicate of soda " fused with a certain proportion of carbonate of soda, so as to render it " a soluble subsalt," when it is dissolved in water, and carbonic acid gas passed into this solution until it ceases to be absorbed ; the silicic acid is precipitated, and carbonate of soda is in solution. " The insoluble " silicate " may " be employed in the manufacture of glass."

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 348 ; Inventors' Advocate, vol. 3, p. 132.]

A.D. 1840, February 25.—N° 8398.

FARMER, Thomas.—" Improvements in treating pyrites and " other matters to obtain sulphur, sulphurous acid, and other " products." These are, " causing them to burn in a furnace " of the following description : The furnace has a doorway at the front for feeding in the materials, and a doorway at the back, and it has two sets of fire bars ; the lower set " receives the small " pieces of pyrites which in charging or otherwise pass between " the upper bars undecomposed, and then they continue to burn " till it is deemed necessary to remove them." The furnace is heated " in the first instance with coals, or with burning pyrites " from a previous operation," when the pyrites is fed in as above. When it is required to produce sulphurous acid, air is admitted " by one or other of these doorways." If sulphur is required, the front doorway is "entirely closed," and only as much air is admitted by the back doorway "as to sustain a slow combustion." The sulphur is collected in a lead chamber connected with the furnace by a pipe from the top. "The occasional admission of "vapour produced by water evaporated from the ash hole" "facilitates the sublimation of the sulphur." "The clinker may "be used for smelting" for "the metal which it contains."

[Printed, 10*d*. Drawing. Repertory of Arts, vol. 15 (*new series*), p. 143; London Journal (*Newton's*), vol. 17 (*conjoined series*), p. 209; Inventors' Advocate, vol. 3, p. 146.]

A.D. 1840, February 25.—Nº 8399.

WILSON, John.—"An improvement or improvements in the "process or processes of manufacturing the carbonate of soda." This consists, first, in adding bicarbonate of soda in certain proportions to a solution of sulphuret of sodium, "on the application of heat sulphuretted hydrogen gas is evolved, and carbonate "of soda remains." The gas evolved may be collected. The carbonate of soda is removed "to a common white ash furnace "and heated to dryness." This is dissolved and crystallized or dried.

Second, "the use of bicarbonate and sesqui-carbonate of soda "in preparing the carbonate of soda from solution of black ash "or from soda ash." The bicarbonate is added in such a proportion as will "convert the caustic soda into the neutral car-"bonate of soda." Carbonate of soda is obtained from soda ash in the same way.

[Printed, 4*d*. No Drawings. London Journal (*Newton's*, vol. 22 (*conjoined series*), p. 45; Inventors' Advocate, vol. 3, p. 163.]

A.D. 1840, March 4.—Nº 8413.

BOWER, Joseph.—"Certain improvements in the manufac-"ture of carbonate of soda." These are, "the use of bicarbonate "of ammonia or the sesqui-carbonate of ammonia in producing "carbonate of soda from the decomposition of sulphate of soda." "Bicarbonate of ammonia," sulphate of soda, and water are agitated together for "from eighteen to thirty-six hours." The solution of sulphate of ammonia is drained from the crystals of bicarbonate of soda, which are afterwards pressed, and heated to convert into carbonate. When sesqui-carbonate of ammonia is used as above, a current of carbonic acid gas is introduced during the agitation.

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 412; Inventors' Advocate, vol. 3, p. 197.]

A.D. 1840, April 6.—Nº 8465.

BLAIR, Harrison, and WATSON, Henry Hough.—" Certain " improvements in the manufacture of sulphuric acid, chrystal- " lized soda, and soda ash, and the recovery of a residuum or " residuums applicable to various useful purposes." These are, first, the application of refuse gas lime " to the manufacture of " sulphuric acid " and " soda, whether soda ash or crystals of " soda, when the same is manufactured through the medium of " the decomposition of sulphate of soda by carbonaceous matter." The refuse lime, in a thin layer, is heated with stirring in a furnace, with a stream of air or oxygen passing through it; the sulphurous acid evolved is passed into a sulphuric acid chamber. The refuse lime, in preference after the above treatment, is used " along with carbonaceous matters, in the decomposition of sul- " phate of soda."

Second, applying sulphuretted hydrogen gas in preparing for concentration, &c., sulphuric acid impure from arsenic and nitrou acid. The gas is passed into the dilute acid until there is no more precipitate of sulphuret of arsenic.

Third, " the application of heated iron pyrites, or refuse iron " pyrites," with " aqueous vapour or hydrogen gas, in the pro- " duction of sulphuretted hydrogen, to be used in the manufacture " of sulphuric acid." The pyrites, at a red heat in a tube, has the vapour or gas passed over it. Also, " the application of the " calcined compound or compounds " formed by heating together " lime, or carbonate of lime, and iron pyrites, or refuse iron " pyrites," together " with acid, in the production of sulphuretted " hydrogen, when it is to be used " as above.

Fourth, " using by combustion, in the manufacture of sulphuric " acid, the sulphur contained in hydrosulphuret of lime, or in the " compound formed by the absorption of sulphuretted hydrogen " by hydrate of lime;" and also " in the manufacture of soda, " the use of the calcareous residuum left, after as much sulphur " has been burnt off from the said compound as it is practicable " to burn off."

Fifth, "the application by combustion of the insoluble residuum "or residuums, or part of each of the said residuums," "resulting "from the manufacture of soda, and to form which lime has been "one of the constituents of the mixture used," in the manufac"ture of sulphuric acid."

Sixth, submitting "to a red heat" the mixture of the several ingredients used in manufacturing sulphuric acid, and also "the "waste gases" from the sulphuric acid chambers, the object, it is stated, being to combine them more rapidly. There are several modes of heating and afterwards condensing the acid vapours.

[Printed, 6*d*. No Drawings. London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 389; Inventors' Advocate, vol. 3, p. 224.]

A.D. 1840, May 12.—N° 8505.

DAVIDSON, JOHN.—"An improvement in the method of pre"serving salt." "Enclosing and packing the same in wooden "cases, boxes, or canisters," in preference, "of a cylindrical "form," and "painted, varnished, and cemented with waterproof "paint or varnish and cement, so as to preserve the contained "salt from damp and injury for any length of time."

[Printed, 8*d*. Drawing. Mechanics' Magazine, vol. 33, p. 501; Inventors' Advocate, vol. 3, p. 322.]

A.D. 1840, June 26.—N° 8555.

NYREN, JOHN WILLIAM.—"Improvements in the manufacture "of oxalic acid." These are, first, "manufacturing oxalic acid "by the application of a product obtained from the farina of "potatoes and sulphuric acid, or diastase." The potatoes are washed, &c., "and pulped, and the starch boiled with a certain "quantity of sulphuric acid, until no starch remains, which is "ascertained by applying a drop of tincture of iodine to a small "quantity of the boiling liquor;" "a purple color" denotes starch remaining. The liquor is filtered, and treated "as is at "present practised when using sugar" for making oxalic acid.

Second, applying horse-chestnuts as above. They are treated as above, only "they do not require washing." In both cases diastase may be used in place of acid.

Third, "manufacturing oxalic acid by means of converting pro"per liquors prepared with nitric or nitros acid in leaden vessels." Large vessel are used in place of small, and vessels of lead, or lined with lead, are employed; the liquors may be heated by a coil of lead pipe in the vessel.

By a Disclaimer entered and filed May 29, 1851, the first and second parts above are disclaimed.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 15 (*new series*), p. 363; and vol. 20 (*enlarged series*), p. 195, for Disclaimer; London Journal (*Newton's*), vol. 19 (*second series*), p. 355; Inventors' Advocate, vol. 4, p. 21 (with Disclaimer).]

A.D. 1840, July 8.—N° 8562.

HARVEY, James.—" Improvements in extracting sulphur from " pyrites, and other substances containing the same." These are " subliming the sulphur downwards into condensing chambers," as follows:—The pyrites broken in pieces is put into pots the shape of a cone, which have covers, and their lower ends have a "perforated plate or grating," and protrude through " circular " apertures in the tiles which form the bottom of the flues and " roof of the condensing chamber;" the upper parts of the pot are resting in circular apertures cut in the tiles " which cover the " top or roof of the flues." There are four rows, five pots in each row. There is a fire in the centre at one end, and the heat from burning "coke, charcoal, or peat," passes in the first instance along the central flue, and in passing round the two end pots proceeds to the right and left, and, by flues, is guided past all the pots, until it enters the chimney. There is water in the bottom of the condensing chamber, and a pipe in the chamber by which a gentle current of air is maintained through the pots and the chamber.

[Printed, 8*d*. Drawing. London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 115; Mechanics' Magazine, vol. 34, p. 92; Inventors' Advocate, vol. 4, p. 52.]

A.D. 1840, July 29.—N° 8577.

CROLL, Alexander Angus.—" Certain improvements in the " manufacture of gas for the purpose of illumination, and for " the preparation or manufacture of materials to be used in the " purification of gas for the purpose of illumination." These are, in reference to this subject, when coal gas is purified of its ammonia by washing it with dilute sulphuric acid, and as the acid gets neutralized, adding carefully more acid and washing the gas " until the liquor in the washing vessel arrives at the sp. gr.

" of 1,170, and is neutral, ascertained by litmus paper." The liquor is to be withdrawn "and evaporated in the ordinary way to " obtain the sulphate of ammonia." When a solution of chloride of manganese, or of iron, or sulphate of manganese is used in place of sulphuric or muriatic acid, to obtain the ammoniacal salts after purification, the insoluble matter is allowed to settle, the clear liquor is drawn off, and evaporated for the salt in the usual manner. The insoluble matter mentioned above may be dissolved in its former acid, or in sulphuric or muriatic acid as required, and again used.

After the gas has been freed of its ammonia it is deprived of its sulphuretted hydrogen by passing it through a dry lime purifier charged "with black oxide of manganese in powder " moistened with water." When this material is saturated with sulphuretted hydrogen, it is roasted in an oven, after it has become "thoroughly red," "from two to three hours," it being well " stirred about in the oven." "After this operation is completed " the material is fit again to be employed." "The same effect " may be produced by the application of the oxide of zinc and " the oxides of iron, and treated precisely in the same way as " above described."

" Manufacturing or preparing or reproducing the salts for the " purification of coal gas" by "double decomposition with " common salt" of the "precipitate that is thrown down from " the chloride of manganese" as follows:—" For every twelve " ounces of the dry precipitate take one pound of common salt " or thereabouts," mix them well together, and expose them for " two or three hours in a heat scarcely visible in the dark." In case salts of zinc were used the mixture is "removed from the " furnace and dissolved in water in the proportion of 140 lbs. to " every 40 gallons of water," and this solution is "placed in the " purifier" for the "purification of the gas from ammonia, as " previously described, in the employment of chloride of manganese," a precipitate is formed, which is again treated with common salt as above described, and the liquor drawn off from the residuum, "being muriate of ammonia and sulphate of " sodium, are to be separated from each other by crystallizing," or "by evaporating both to dryness, and subliming the muriate " of ammonia from the salts of sodium, the latter being left in the " subliming pot." "The precipitates formed in using any of

" the salts of manganese and iron above mentioned, or any of " the salts of zinc (when zinc is used, as previously patented by " me), may be re-formed in like manner."

[Printed, 4*d*. No Drawings. Mechanics' Magazine, vol. 34, p. 140; and vol. 60, p. 68; Inventors' Advocate, vol. 4, p. 84.]

A.D. 1840, August 1.—N° 8582.

TROUBAT, Felix.—(*A communication.*)—" Improvements in " the manufacture of vinegar." These are as follows: potatoes in certain quantity are rasped and grated, and water and sulphuric acid added, and the whole boiled for six hours, and yeast with a small quantity of potash added, and after three days more yeast is added; the liquor after standing is " drawn off into another " vessel which is filled loosely with the shavings of beech wood, " or the husks or skins of grapes after they have been pressed," saturated " with strong vinegar;" after some time it is drawn off in small quantities by a cock at the bottom of the vessel, and " carried to another vessel half full of vinegar, which will com- " plete the process." Another mode is to soak the crushed potatoes in cold water, adding boiling water till it becomes a thick paste, to which meal of malt is added in certain proportion, " which " brings it into a saccharine state;" the liquid is then submitted to the other part of the process.

The meal of rice is substituted for the potatoes in the above processes.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 16 (*new series*), p. 120; Mechanics' Magazine, vol. 34, p. 188; Inventors' Advocate, vol. 4, p. 99.]

A.D. 1840, August 27.—N° 8607.

SMITH, Charles.—" Improvements in the manufacture of lime " and cement, or composition." These are, in reference to this subject, as follows:—First, " having the kilns so formed that the " charge in the upper part of a kiln shall be calcining whilst the " charge in the lower part thereof shall be cooling, and in cooling " the heat and vapours therefrom shall pass to the charge in the " upper part." And also " in such manner that the calcined " products are drawn into a close chamber to cool before being ' drawn into the atmosphere, and the carrying of the gases or " vapours so as to apply them to useful purposes." The kiln is a long upright chamber, and " in place of the heat being applied " at the lowest part of the kiln," the " heat and flame are applied

" at a considerable height up, and in such manner that the charge
" below may cool before being drawn into the atmosphere, and
" by which the heat and vapours evolved from the charge in cool-
" ing will pass up amongst the charge in the upper part of the
" kiln." At the bottom of the kiln is a door through which parts of the charge are drawn from below, and that which is above will descend and allow of further quantities to be charged into the kiln at the top. About half-way up on one side of the kiln is placed a coke oven, the waste heat from which passes into the lime kiln by a flue; this oven also heats an oven above, and an oven below it. "These ovens are for the operation of calcining
" so as, if thought proper, their contents can be discharged
" through an aperture in the floor of the ovens and cooled with-
" out coming in contact with the external air, such apertures
" being closed during calcination." On the other side of the kiln are two ovens, the volatile gas or vapours from the materials in which pass into receivers or condensers, or otherwise. These ovens can be heated by separate fires, or by a coke oven, and the waste heat passes by a flue into the kiln.

Second. "The application of the heat of lime kilns to the
" purposes of evaporating fluids in suitable boilers or pans."

Third. "The mode of slacking lime in chambers with carbonic
" acid" as follows:—The burnt lime is placed in a dry covered chamber, and the gas from a flue falls through an aperture upon it, and "in this manner" it is slacked.

Fourth. "Manufacturing lime by re-calcining it after dry slack-
" ing" as follows:—The lime slacked as above is distributed over the bottom of an oven by a rake about four inches thick, and when the carbonic acid is driven off it is dropped "into the vault
" and then allowed to cool, and then taken and ground, and finely
" sifted and put into tight casks and kept for use, or it can be
" immediately applied to any kind of work."

Fifth. "The mode of manufacturing lime by partially calcining
" lime-stone in a kiln, in order to convert it to sub-carbonate, and
" after cooling and grinding again to calcine it, whether separate
" or combined with other matters, for making cements."

The remainder of the Specification principally refers to the making and treating of cements.

[Printed, 1s. 8*d*. Drawings. Mechanics' Magazine, vol. 34, p. 205; Inventors' Advocate, vol. 4, p. 148; Engineers and Architects' Journal, vol. 4, p. 124.]

A.D. 1840, August 27.—Nº 8608.

WATERTON, Henry.—" Improvements in the manufacture of " sal ammonia." These are decomposing common salt by means of " carbonate of ammonia as denoting either sesqui-carbonate or " bicarbonate." The carbonate in lumps is added to a saturated solution of common salt and mixed well together, and in preference carbonic acid gas is passed into the mixture. " The solid " matter thus obtained is chiefly bicarbonate of soda," which is pressed. The liquid is distilled for a small portion of undecomposed carbonate, the common salt undecomposed is crystallized by evaporation, and by further evaporation the muriate of ammonia or sal ammoniac crystallizes. Another mode is to take rectified gas liquor containing a certain per-centage of carbonate of ammonia, and add powdered salt with stirring, and "infusing into the mixture as " much carbonic acid gas as it will absorb." " The solid matter " thus obtained is chiefly bi-carbonate of soda." The liquid is proceeded with as above.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 15 (*new series*), p. 302. London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 35.]

A.D. 1840, September 10.—Nº 8627.

PATTINSON, Hugh Lee.—" Improvements in the manufacture " of white lead." These are, " the mode of manufacturing white " lead by means of carbonate of lime and the chloride or nitrate " of lead." Chloride of lead and carbonate of lime in "chemical " equivalents " are ground together in a mill with water for several hours, and allowed to stand all night, and the liquid, which is chloride of calcium principally, is drawn off; more water is added, and " the grinding renewed for a few hours," and " the " whole allowed to settle as before till next day," when " the clear " solution is again drawn off, fresh water added," and the grinding renewed, and in this way the process is continued day after day until the water comes off nearly tasteless. The white mass, which is carbonate of lead nearly free from chloride of lead and carbonate of lime, is "dried and prepared in the usual manner for the market." Sometimes an excess of chloride of lead is used, and when the water ceases to be bitter an alkaline carbonate a little in excess is added, so as to "convert the excess of chloride of lead into car- " bonate," and the grinding and washing continued till the alkaline chloride is washed away. “ Instead of grinding the materials “ together with pure water,” the materials may be introduced into a revolving barrel “ nearly full of pure water,” and carbonic acid gas is forced into the barrel “ till the water within is saturated under a “ pressure of four or five atmospheres,” when the barrel is made to revolve. In three or four days the solution of chloride of calcium is drawn off, fresh water is added and carbonic acid gas forced in as before, and the revolving renewed for “ a day or two longer, at the “ end of which time the decomposition is fully completed, and the “ carbonate of lead produced is to be well washed and dried in the “ usual manner.” “ A solution of carbonate of lime in water impreg- “ nated with carbonic acid gas,” is also employed to precipitate carbonate of lead from a solution of the chloride. Nitrate of lead may be employed in place of the chloride in the above processes, only always employing “ the exact chemical equivalents of the two “ substances.”

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 15 (*new series*), p. 292; London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 279; Mechanics' Magazine, vol. 34, p. 249; Inventors' Advocate, vol. 4, p. 182.]

A.D. 1840, December 16.—N° 8735.

WILDES, George.—“ Improvements in the manufacture of “ white lead.”

[No Specification enrolled.]

A.D. 1840, December 23.—N° 8748.

GREGSON, John Brumwell.—“ Improvements in pigments “ and in the preparation of the sulphates of iron and magnesia.” These are, first, “ the application of oxide of iron obtained by the “ action of lime upon chloride of iron, to the manufacture of Vene- “ tian red, and also the collecting of the sulphurous acid evolved “ in the making of Venetian red by the calcination of gypsum, or “ sulphate of lime with sulphate of iron, and the conversion of “ the same into sulphuric acid ” by the method afterwards described. To obtain the oxide of iron, pouring in an excess of a solution of chloride of iron into cream of lime, stirring well, washing the oxide of iron to free it from chloride of calcium, after which it is dried and mixed with about two or three times its weight of sulphate of lime, and exposed in a reverberatory furnace until it assumes the well-known colour. The collecting the sulphurous acid evolved as above, small pieces of gypsum are introduced into the bottom of a retort and the retort is nearly filled with the mixed sulphates, in preference the "sulphate of iron is " dried and reduced to powder along with the sulphate of lime." As soon as these materials become red hot the upper end of the retort is closed, and a current of air is forced through it by a pump, or steam is rushed through it. The air or steam carries along with it the sulphurous acid into a vitriol chamber, where it is converted into sulphuric acid. When the decomposition of the iron salt is effected, the residue is ground and washed.

Second. Preparing a new black pigment by placing in a retort oxide of iron, heating it red hot, removing the retort from the furnace, closing the mouth of the retort, and forcing in by means of a pipe and air pump hydrogen or carburetted hydrogen gas through it, until inflammable gas issues out at the perforation at the end of the retort, and "then close the perforation and keep the " materials entirely free from contact with atmospheric air until " cold. The oxide of iron is thus converted into the protoxide " of iron which forms the black pigment, and is prepared for use " by grinding and washing as usual."

Third. "Making of sulphate of iron by dissolving silicate of " iron in sulphuric acid," as follows:—the slag or refuse of balling furnaces of iron works is ground into a fine powder, put into a shallow vessel lined with lead, made into a thin paste with water, and an equal weight of sulphuric acid of about 1·845 sp. gr. gradually added to it, previously diluted with its own weight of water, constantly stirring the mixture. When cold, a solid mass of impure sulphate of iron is obtained. The sulphate of iron is dissolved in about its own weight of water, and the clear liquor with the washings evaporated and crystallized.

Fourth. "Making sulphate of magnesia by acting upon calcined " magnesian limestone with sulphate of iron." About 100 lbs. of magnesian limestone in fine powder is heated in a retort like a gas retort "at a low red heat for two or three hours, until it ceases " or nearly so to give off carbonic acid gas (which at that temperature is expelled from the carbonate of magnesia only)." Dissolve " in an iron boiler about 100 pounds of crystallized sulphate of " iron in about three or four times its weight of water, and then " stir in the calcined magnesian limestone and boil the mixture " for about one hour." The solution is tested by prussiate of potash, and if any iron is present, more calcined magnesian limestone is added, and the clear solution is evaporated and crystallized; the residue is calcined and used as a brown pigment.

[Printed, 4*d*. No Drawings. Mechanics' Magazine, vol. 34, p. 13; Inventors' Advocate, vol. 5, p. 4.]

A.D. 1840, December 31.—Nº 8765.

SEWELL, Thomas Robert.—"Certain improvements in ob-"taining carbonic acid from certain mineral substances." The substances preferred are those "which contain carbonate of mag-"nesia," as "bitter spar, dolomite, and magnesian limestone," but carbonate of iron may be used. These are broken into pieces, say from one ounce not to exceed two pounds, and distilled at a red heat in a retort such as a gas retort. The gas is purified by passing through a vessel containing gravel or coarse sand, "mois-"tened with water or a dilute solution of soda," before entering "an ordinary gas-holder."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 18 (*new series*), p. 47; London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 163; Mechanics' Magazine, vol. 35, p. 60; Inventors' Advocate, vol. 5, p. 21.]

A.D. 1841, January 26.—Nº 8815.

FURNIVAL, John Bradford.—"Improvements in evaporating "fluids, applicable to the manufacture of salt and to other pur-"poses where evaporation of fluids is required."

[No Specification enrolled.]

A.D. 1841, March 8.—Nº 8866.

NEALE, John William, and DUYCK, Jacque Edouard.—"Certain improvements in the manufacture of vinegar, and in "the apparatus applied therein." These are said to be, first, the "improved process and apparatus" for "manufacturing vinegar "from beetroots."

Second. "The process and apparatus" for "effecting and "maintaining the acetous fermentation, and all such modifications "of the same, wherein the acetous fermentation is conducted by "the combined operation of an air-forcing apparatus, and steam "heat applied in pipes or vessels within the acidifying vessel," whether "applied to the making of vinegar from beetroots or "any other substances."

Third. "The application of an air-forcing apparatus in the "manufacture of vinegar or acetous acid, distinctly considered "from the other parts of the apparatus."

The beetroots deprived of their tops and shoots are washed, rasped, and the pulp pressed in bags; the juice attenuated to "about 5°," in preference is boiled by steam in a wooden vessel, and cooled to about 60° F., when it is conveyed into the fermenting vat and yeast added to it, and the whole fermented, and the wash is afterwards converted into vinegar in a vat, having near its bottom a rose pierced with numerous small holes, communicating by a pipe with a blowing cylinder, or any other kind of suitable blowing apparatus; a steam worm lies on the bottom of the vat; three "diaphgrams or false bottoms perforated with "numerous small holes," are "placed below the surface of the "liquid at equal distances from each other." Into this vat, capable, say, of containing 20,000 gallons "2,000 gallons of "vinegar to serve as mother" is put along with a like quantity of wash and a little yeast; as soon as fermentation sets in, the air is forced in, while the temperature of the vat is kept at 70° or 80° F. by the steam pipe; in a few days the whole of the liquid is converted into vinegar, when 4,000 more gallons of the wash are let into the vat, and the blowing and temperature kept up, and "the process is continued until by successive additions the vessel "contains 24,000 gallons of vinegar." When 8,000 gallons are pumped into the clarifying vessels, where they are clarified by the ordinary means, and "8,000 gallons of fresh wash is pumped "into the acidifying vessel, where, becoming completely acidified, "in a few days, that quantity of vinegar may be withdrawn from "the vat, and replaced by a like quantity of fresh wash, and so "on continually."

[Printed, *6d.* Drawing. Mechanics' Magazine, vol. 35, p. 252; Inventors Advocate, vol. 5, p. 179.]

A.D. 1841, March 8.—Nº 8868.

SMITH, BENJAMIN.—"An improved apparatus for making salt "from brine." This consists "of a large horizontal salt pan" with two fire-grates beneath one end, the flue continuing backwards; the sides of the fire-places, "instead of being brickwork," are the "sides of iron vessels containing water" and the steam from these vessels is conveyed by pipes beneath the "false bottoms

" of other additional salt pans " " situated over the first mentioned " salt pan." The upper parts of these side vessels form part of the bottom of the salt pan first mentioned, the front part of which pan is "covered over with a close cover" to receive the " steam from so much of the brine as is beneath that cover ;" and the upper part of that steam vessel forms the bottom of another small additional open pan. In this covered part of the first-mentioned pan is " a deeper part called a pocket," "being two long " narrow troughs " descending below the bottom of the pan: the salt deposited is "swept at short intervals of time " into these pockets, " by means of a scraper or row of scrapers moved hori- " zontally across the said flat bottom." The pockets extend a little beyond the upright sides of the close cover before mentioned ; these parts are open at the top, so as to allow the salt to be removed at any time.

[Printed, 1s. Drawing. Mechanics' Magazine, vol. 35, p. 239, Inventors' Advocate, vol. 5, p. 182.]

A.D. 1841, March 8.—Nº 8872.

THOMSON, Anthony Todd.—" An improved method of " manufacturing calomel and corrosive sublimate." " A glass, " earthenware, or other suitable vessel " containing the mercury or quicksilver, open at both ends, is heated by an open fire to a temperature of " between 350° and 660° of F. ;" chlorine gas is passed over the mercury and combines with its vapour, and the mercury salt is condensed in a chamber beyond. " The combina- " tion of the two gases forms either corrosive sublimate or calo- " mel, according to the quantity of chlorine gas which is em- " ployed."

[Printed, *6d.* Drawing. London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 357 ; Mechanics' Magazine, vol 35, p. 250 ; Inventors' Advocate, vol. 5, p. 180.]

A.D. 1841, March 15.—Nº 8878.

LAMING, Richard.—" Improvements in the production of " carbonate of ammonia." These are, causing " ammonia gas " and carbonic acid gas," obtained separately, " to traverse a suc- " cession of leaden chambers," kept cool, " so as to favor the " admixture of the dissimilar gases." Sometimes placing " in the

" bottom of one or more of the chambers a stratum of water, or " of water impregnated with ammonia."

[Printed, 4*d.* No Drawings. Repertory of Arts, vol. 17 (*new series*), p. 96; London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 197; Mechanics' Magazine, vol. 35, p. 285. Inventors' Advocate, vol. 5, p. 197.]

A.D. 1841, March 16.—N° 8884.

DYER, Charles Bunt.—" An improved method of obtaining " paints or pigments by the combination of mineral solutions " and other substances." This consists in adding, in preference, a " mixture of quicklime and water, or a solution of any other " calcareous substance," to a "mineral water holding in solution " either sulphate of iron, or oxide of iron, or sulphate of copper, " or sulphate of zinc, or any two or more of the said mineral " substances." A precipitate is " produced, which, when dried, " or washed and dried," may be employed as a paint or pigment, or " may be converted by the ordinary process of calcination into " a paint or pigment of any of the colours produceable by that " process."

[Printed, 4*d.* No Drawings. London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 35; Mechanics' Magazine, vol. 35, p. 286; Inventors' Advocate, vol. 5, p. 196.]

A.D. 1841, March 17.—N° 8886.

CLOUGH, William Thompson.—" Improvements in the " manufacture of carbonates of soda and potash." These are, first, " the use of silica to neutralize the causticity of the salts of " soda and potash, and thus to facilitate the obtaining of crystals of carbonate of soda."

Second, obtaining carbonate of soda or potash in combination with silicate of soda or potash, by which means the properties of the " carbonates will be materially enhanced." The silica is applied " either to the alkaline liquor in the boiling-down furnace," or by preference the silica is mixed " with a shovel or other " instrument," " with the salts from the boiling-down furnace," and the " combined materials " are thrown into " the finishing or " carbonating furnace." The silica is employed in certain proportions. In crystallizing the carbonate of soda " the residual " liquor " retains " the whole of the silicate of soda."

[Printed, 4*d.* No Drawings. Repertory of Arts, vol. 17 (*new series*), p. 176; Mechanics' Magazine, vol. 35, p. 287; London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 50; Inventors' Advocate, vol. 5, p. 196.]

A.D. 1841, April 15.—Nº 8925.

HILLS, Frank, and HILLS, George.—" Certain improvements " in the manufacture of sulphuric acid and carbonate of soda." These are, first, " the general arrangement and construction " of a furnace for burning pyrites. " The ignited fuel of a coke oven or " other large fire " communicates with a transverse flue; a range of flues all branch from this flue at the same level, and " after " making one or more turns " terminate in a flue leading to the " chimney. The spaces between each turn of the flue are divided " by walls " into ranges of compartments or chambers," " in which " the pyrites are burned." Sliding doors regulate the admission of air, " so as by combination with the sulphur drawn off from the " pyrites to form sulphurous acid gas."

Second, " the grinding and subsequent burning of the residuum " of pyrites," which " has been previously used for making sulphuric acid on the common plan," and exposing the same to fire and air in thin layers.

Third, refuse gas lime is boiled, and the sulphuretted hydrogen driven off passes through a refrigerator and through a platina pipe to a red hot chamber, where it is burnt, and the products conducted into an oil of vitriol chamber.

Fourth, " making of carbonate of soda by means of caustic " barytes." Carbonate of barytes precipitated is mixed with carbonaceous matters, and the whole made into lumps, which are burned in a kiln. On lixiviating the result, caustic barytes is in solution. The solution added to sulphate of soda, caustic soda is in solution, and may " be converted into carbonate in the usual " way by putting it into a reverberatory furnace."

[Printed, 6*d*. Drawing. Mechanics' Magazine, vol. 35, p. 349; Inventors' Advocate, vol. 5, p. 261.]

A.D. 1841, May 27.—Nº 8973.

SHANKS, James.—" Improvements in the manufacture of carbonate of soda." These are, first, the " black ash or impure " carbonate of soda " in fragments is spread upon trays in a chamber and moistened, and carbonic acid gas is passed through it " till the whole of the soda and lime are carbonated."

Second, a lye made " from the black ash " is made to percolate through a bed of pebbles, through which carbonic acid gas is being passed. The soda is perfectly carbonated when the liquor has "lost its greenish yellow color." This last method of "carbonating" the soda is preferred.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 17 (*new series*), p. 170; London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 34: Mechanics' Magazine, vol. 35, p. 448; Inventors Advocate, vol. 5, p. 356.]

A.D. 1841, July 21.—N° 9034.

PHILIPPI, Frederick Theodore.—(*A communication.*)—"Certain improvements in the production of sal ammoniac, and "in the purification of gas for illumination." These are, first, taking from coal gas "all the ammoniacal substances" it contains, also "naphtha or naphthaline." This is effected by passing the gas through "three cisterns or wash boilers, one placed higher "than the other," in each of which is an agitator, and containing "a saline metallic solution, for instance, of manganese, iron, zinc, "copper, lead, antimony, &c." The sulphate or chloride of manganese "is preferred on account of its cheapness; before using it, any free acid is neutralized by the ammoniacal water from gas "works." After the solution in the first vat is saturated wit the ammonia from the gas, the clear liquid is drawn off from the precipitate "and acted upon by a little sulphuric, hydrochloric, "or other acid, according to the nature of the salt which saturates "the ammonia, and then it is evaporated to chrystallize." "This "process is also applicable for removing the ammoniacal sub-"stances" disengaged in distilling "bones or other animal sub-"stances, and all such as produce ammonia by the action of heat."

Second, distilling off the ammonia from ammoniacal substances as follows:—The vapours are distilled by steam or otherwise from the first boiler containing lime, and the ammoniacal waters pass into a second boiler similarly charged. "The condensing of the ammoniacal vapours heats the second boiler" and "the vapors emitted by the second boiler" pass into a "third boiler, "in which there is a solution of lime," and from thence into a vessel containing strong alkali, and ultimately into a "Woolf's "apparatus." The ammonia "may be sufficiently pure for com-"merce," but it may be changed into a salt by combining it in the liquid or gaseous state with acids in a liquid or gaseous state.

[Printed, 10*d*. Drawing. London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 364.]

A.D. 1841, August 4.—N° 9041.

LEE, John.—"Improvements in the manufacture of chlorine." These are, first, "manufacturing chlorine by the use of retorts or "ovens," "so arranged as to have the heat requisite for the pro- "cess transmitted downwards through the coverings or arches of "the retorts or ovens."

Second, "constructing the troughs or bottoms of ovens or "chambers for evolving chlorine when fire-heat is used below or "at the sides or top, each of one piece of stone or moulded clay." The stone is such as is used in the flues, &c. of alkali works; the clay is fire-clay.

[Printed, 8*d*. Drawing. Repertory of Arts, vol. 17 (*new series*), p. 257; Mechanics' Magazine, vol. 36, p. 142.]

A.D. 1841, September 4.—N° 9060.

HOMPESCH, Theophill Anton Wilhelm, Count de.—"Improvements in obtaining oils and other products from "bituminous matters, and in purifying and rectifying oils "obtained from such matters." These are in reference to this subject, first, "the ammoniacal water which is formed in the "distillation of schist" may be "used in the manufacture of "ammonia by the ordinary means."

Second, "the acidulated tar by an addition of chloride of "sodium in the ordinary manner, will be found applicable to "the production of the sulphate of soda and the sulphate of "Glauber."

By a memorandum of alteration enrolled the 16th July 1842, "the terms bituminous schists, shales, or slates, or other rocks "or minerals containing bitumen or bituminous substances" are substituted in every part of the Specification "for the term "schiste or clay slate."

[Printed, 1*s*. 4*d*. Drawings. London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 369; Mechanics' Magazine, vol. 36, p. 254.]

A.D. 1841, September 4.—N° 9064.

WILDES, George.—(*A communication.*)—"Improvements in "the manufacture of white lead." These are, first, "the forma- "tion of pure carbonate of lead, known to painters as good "white lead, by the attrition of lead in water in closed vessels "supplied with carbonic acid."

Second, "the adaptation" for this purpose of a shallow tub with a hollow axis placed "so that the plane of its bottom forms "an angle of forty degrees, or more or less, with the horizon," it is revolved "at the rate of twelve or fourteen times per "minute." "When the tub revolves the axis revolves with it;" "the axis communicates with a generator of carbonic acid gas "and with the interior of the tub."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 18 (*new series*), p. 42; Mechanics' Magazine, vol. 36, p. 255.]

A.D. 1841, September 24.—N° 9102.

PATTINSON, Hugh Lee.—"Improvements in the manufac-"ture of white lead, part of which improvements are applicable "to the manufacture of magnesia and its salts."

These are, first, "the dissolving of magnesian limestone and "other earthy substances containing magnesia in a soluble form, "by submitting the same to the action of water impregnated "with carbonic acid gas;" also, "the dissolving of magnesia "by the same mode of operating, out of the impure hydrate of "magnesia obtained by the action of hydrate of lime on a "solution of chloride of magnesium."

Second, applying the above "solution of bicarbonate of "magnesia to the manufacture of carbonate of magnesia," by evaporating it to dryness, and preparing magnesia by calcining this carbonate, also making the sulphate by neutralizing "the "solution of bicarbonate" with sulphuric acid, boiling down and crystallizing; or the bicarbonate is boiled with a solution containing "its equivalent quantity of iron, the carbonate of "iron precipitates, and the solution of the sulphate of magnesia "is evaporated."

Third, "the application of a solution of bicarbonate of "magnesia to the manufacture of white lead by precipitation," any "soluble salt of lead being used, but chiefly the chloride." A saturated solution of chloride of lead is mixed with an excess of the solution of the bicarbonate, the mixing being made as rapidly as possible.

Fourth, "the application of caustic alkali" to the above precipitate, so as to convert any chloride formed into hydrated oxide of lead. They are ground together in a mill in a pasty state, allowed to remain for a few days, when the alkaline chloride formed is removed by washing.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 3 (*enlarged series*), p. 352; London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 288.]

A.D. 1841, October 20.—N° 9123.

FURNIVAL, JOHN BRADFORD.—" Improvements in evapo-" rating fluids, applicable to the manufacture of salt, and to " other purposes where evaporation of fluids is required."

[No Specification enrolled.]

A.D. 1841, November 4.—N° 9139.

LEJEUNE, JULES.—" A means of condensing and collecting " the sulphurous and metallic vapours which are evolved in the " treatment by heat of all kinds of ores." " To arrive at the " results announced in the title," " the new and the old prin-" ciples " applied " are six in number, and by the aid of steam," and consist as follows, first, " the passage under water of vapour, " separated or mixed with the smokes of fire-places."

Second. " The use of a vapour spout as a means of suction."

Third. " The action of currents one upon the other, and upon " the surrounding air."

Fourth. " A close furnace for the operations of roasting, boil-" ing, subliminating, gassification, &c."

Fifth. " The decomposition of sulphurous acid by sulphuretted " hydrogen."

Sixth. " A furnace with winding chimnies alternately used shut " or open."

In treating a sulphurous mineral of copper with the appliances above described, " sulphuretted hydrogen gas mixed with vapour " of water, meets in its course above the water of the condensator " the sulphurous acid, drawn by the draft of the reduction fur-" naces, these two gases combine to form water, and abandon the " sulphur which constituted them ; " this deposits in " the water " of the conduits with the arsenical acid, and the gas resulting " from the combustion, deprived of hurtful substances, are carried " out by the high chimney."

[Printed, 2*s*. 2*d*. Drawings.]

A.D. 1841, November 9.—N° 9145.

NEWTON, William Edward.—(*A communication.*)—" Certain improvements in the production of ammonia." This consists in " the application to the production of ammonia pure, " or in combination with vapour, or with vapour and other " volatile matters," " of any apparatus whose construction and " use are such as to cause, by means of diaphragms, a liquid " containing ammonia in a volatile state, and steam, to pass " in mutual contact, and in opposite directions, whereby a given " quantity of heat is made to liberate ammonia from ammoniacal " liquid." The apparatus described is an upright vessel divided by perforated horizontal diaphragms into a number of chambers. Fitted to each diaphragm are several valves which rise when elastic matters accumulate under them. A pipe attached to each diaphragm passes " from about an inch above its upper surface " to near the bottom of a cup or small reservoir fixed to the " upper surface of the diaphragm next underneath," which cup, when filled with liquid, forms " a trap, by which the upward " passage of the elastic matters by the pipe is prevented." " The " vessel may rest on a close cistern, contrived to receive the " descending liquid as it leaves the lowermost chamber." The cistern, or in its absence the lowermost chamber, contains a pipe which supplies steam. The ammoniacal liquors are fed in by a pipe at the top, and another pipe on the top conveys off the ammonia vapours.

[Printed, *6d.* Drawing. London Journal (*Newton's*), vol. **22** (*conjoined series*), p. 217; Mechanics' Magazine, vol. 36 p. 495.]

A.D. 1841, November 9.—N° 9147.

GARNETT, John, and WILLIAMS, Joseph.—" An improved method of manufacturing salt from brine." It is stated " that triangular flues or chambers have been proposed to " be used, and to have steam passed through them when con- " tained in salt pans," but it is believed without success; and that this invention consists in " the mode of heating brine " for the above purpose " by applying cylindrical or curved surface " pipes or tubes for conveying steam through brine." " The " cistern or pan containing the brine," may be made of " slabs " of stone, slate, earthenware, wood, metal," &c., " preferring

" those that are bad conductors of heat, and on which the salt " may be deposited without injury."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 18 (*new series*), p. 28; London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 302; Mechanics' Magazine, vol. 37, p. 43.]

A.D. 1841, November 11.—Nº 9154.

DUCLOS DE BOUSSOIS, Edward Joseph François.— " Improvements in the manufacture of copper." These are, first, " calcining all sulphurous ores of copper " in large kilns, by which means coal and labour " are economized, and the sulphurous acid " gas and sulphuric acid formed in the operation irretrievably lost " in the ordinary method are made applicable to the manufacture " of sulphur or sulphuric acid."

Second. Treating the calcined ores " in a blast furnace similar " to those used in the manufacture of iron, with addition of " chambers of condensation and feeding apparatus," " such additions being calculated to insure the collecting of any volatile " produce that the ores treated may contain." The earthy matters in the ores are fluxed by a proper addition of lime, &c., " as the chemical composition of the ores to be treated may " require."

Third. " The mixture of metallic copper with cast iron thus " obtained in the preceding operation is then submitted to fusion " and liquidation in a common ironfounder's cupola " arranged by partial divisions to keep them at a high temperature, so as to allow to separate by difference of gravity the copper and cast iron, the copper being under the cast iron, and " both of which " are tapped at various levels."

Fourth. " The black copper from which the cast iron has been " separated by difference of gravity is then submitted to the " refining process, as in the usual method, in the refiner attached " to the furnace of liquidation."

[Printed, 10*d*. Drawings. Repertory of Arts, vol. 18 (*new series*), p. 15; London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 182; Mechanics' Magazine, vol. 36, p. 476.]

A.D. 1841, November 11.—Nº 9156.

YOUNG, James.—" Certain improvements in the manufacture " of ammonia and the salts of ammonia, and in apparatus for " combining ammonia, carbonic acid, and other gases with

" liquids." These are, first, " the manufacture of ammonia by " distilling guano and hydrate of lime, or any other caustic " alkali," in an iron retort in which there is an agitator, heating first moderately, and gradually increasing the heat " till the " bottom is nearly red-hot," and passing the gaseous products through a condensing apparatus consisting " of an oblong box " of iron, lead, stone, or other suitable material, the top of which " inclines upwards from the entrance pipe," with an escape pipe, which is in the other end of the box leading from the top. This box " is completely filled with water;" " at the lower end of " the box there is a bridge," uniformly perforated with holes, " by means of which the gases as they enter from the pipe" " are caused to distribute themselves uniformly over and through " the water. The ammonia is absorbed by the water," the insoluble gases pass off by the escape pipe. " The quantity of " water through which the gases are required to pass may be " greatly increased by the insertion in the condenser of one or " two or more inclined shelves with a perforated bridge to each." " The efficiency of the condenser may be still further augmented" by having some of the surfaces fluted. A safety tube or valve is attached to the pipe leading from the retort.

Second, making carbonates of ammonia " by passing carbonic " acid through a solution of ammonia contained" in either of the above condensers.

Third, making sulphate or muriate of ammonia " by passing " ammonia through sulphuric or muriatic acid," contained as above.

Fourth, " the condensing apparatus of each and every one of " the forms aforesaid," for any of the above purposes.

[Printed, 8*d*. Drawing. London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 30; Mechanics' Magazine, vol. 36, p. 413.]

A.D. 1842, January 13.—N° 9218.

JONS, James.—" Improvements in smelting copper ores." These are, in reference to this subject, if the process of smelting described " is not conducted with attention and success, a portion " of the iron, partly in a metallic state, and partly in combination " with copper and various substances, deposits at the bottom and " on the sides of the cupola in the state of a hard incrustation, " which it is necessary to remove. This is done by taking out

" one or more of the metallic plates as may be required, so that " access may conveniently be obtained to the interior of the " furnace, and the deposited substance removed, without the " necessity of pulling down and reconstructing the whole. This " metalliferous substance contains, with other substances, iron " and copper," which are separated by subjecting it "to the " action of muriatic or sulphuric acids, so as to dissolve the iron " it may contain," and making "muriate or sulphate of iron " according to the acid employed, and the residuum consisting of " copper, in combination with other substances, is further treated " as regulus of copper," or the metalliferous substance is heated strongly in a puddling or reverberatory furnace, and is submitted to strong pressure, which causes "the copper, in combination with " earthy and other matters, to exude from the mass."

[Printed, 10*d.* Drawing. London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 327.]

A.D. 1842, January 13.—N° 9222.

WATERTON, Henry.—" Improvements in the manufacture " of salt." These are, " constructing salt pans by combining a " flat-bottomed pan " with " angular, or it may be curved pans." Two furnaces are divided by a wall which runs from end to end of the combined pan; the flat pan is nearest to the furnaces, and the angular pans follow the flues from the furnaces, pass along only one side of each of the pans; the angular pans are deeper than the flat pans. By this arrangement, it is said, where the greatest heat is applied the least salt is deposited, and " the salt is carried " down and deposited in the angular parts of the pan, and the " flat part of the pan over the fire is kept entirely void of salt.

[Printed, 10*d.* Drawing.]

A.D. 1842, February 9.—N° 9251.

BAGGS, Isham.—" Improvements in obtaining motive power by " means of carbonic acid, and also by a peculiar application of " heated air." These are, the mode of working, " whereby car- " bonic acid in the form of gas is evolved and used as a means " of pressure to obtain motive power, and then absorbed, and the " matters used for evolving and absorbing the gas are used over " and over again." There are two vessels containing respectively solutions of " super-sulphate of ammonia and carbonate of am-

" monia," and these solutions are by means of pumps introduced into a vessel "in proper quantities in relation to each other, so as " to evolve the whole of the carbonic acid contained in the carbo- " nate of ammonia." The gas thus evolved is made to pass off through a pipe to a cylinder or engine having a piston and piston rod, &c., &c.; it is not thought necessary to describe the engine. The tube conveying the gas to the engine is coiled, and is made to pass through a vessel containing ammonia, at the bottom of which a tube delivers the carbonic acid from the eduction way of the cylinder of the engine; any carbonic acid gas not absorbed will pass by a tube to the bottom of another vessel containing ammonia. The liquors in these vessels are converted into carbonate of ammonia, and are from time to time drawn into one of the first two vessels by a pipe. The pipes or vessels are to be kept supplied with a solution of ammonia in order to take up the carbonic acid as it comes from the eduction way of the engine by a pipe leading from a receiver, into which ammonia is brought by a retort distilling the sulphate of ammonia from the vessel into which the super-sulphate of ammonia and carbonate of ammonia were pumped. The remaining matter in the still is super-sulphate of ammonia, which may be drawn off into one of the first two vessels.

By a Disclaimer granted August 9th, 1842, the following words, " and also by a peculiar application of heated air," are disclaimed, and a description of that part of the invention is given.

[Printed, 8*d.* Drawing. Repertory of Arts, vol. 18 (*new series*), p. 328; London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 8; Mechanics' Magazine, vol. 37, p. 433; Record of Patent Inventions, vol. 1, p. 16.]

A.D. 1842, March 31.—Nº 9310.

SEYBEL, JULIUS.—" Improvements in the manufacture of " sulphate of soda and chlorine." These are, first, " manu- " facturing sulphate of soda by decomposing common salt by " sulphuric acid in close vessels or retorts made of or lined " with lead, and heated externally " by " oil or other suitable " material " contained in a jacket. The temperature to which the retort is to be heated need not " exceed 330° F."

Second, " manufacturing chlorine by means of the vapours of " gas of muriatic acid, introduced below water in which man- " ganese is immersed."

Third, "stirring or agitating of manganese with water when "being acted on by vapours of gas of muriatic acid in the manu-"facture of chlorine;" this is effected by the shaft of the agitator passing through the stuffing box protected by a covering of lead.

[Printed, 8*d*. Drawing. Repertory of Arts, vol. 18 (*new series*), p. 285; Mechanics' Magazine, vol. 37, p. 476; Record of Patent Inventions, vol. 1, p. 165.]

A.D. 1842, October 8.—N° 9486.

TURNER, WILTON GEORGE.—"Improvements in the manu-"facture of alum." These are, "the production of substances "similar to alœlite and nepheline artificially by the decomposi-"tion by water of the glassy substances produced by the fusing "of felspar" or other mineral substances containing silica and alumina, with salts of potash and soda," and "the use and appli-"cation of such artificial alœlite and nepheline in the produc-"tion and manufacture of alum," and the process of "separating "the alkalies from silica by means of lime." To make potash alum, potash felspar is ground to powder, mixed with a certain proportion of sulphate of potash, and fused in a fret or reverberatory furnace, and when of the appearance of glass carbonate of potash is "gradually and proportionally" added. The glass thus obtained is boiled in water, when "a light porous substance, "similar in chemical composition to the mineral called alœlite" remains; this residue is washed, and boiled with dilute sulphuric acid, but not in excess, and the solution thus obtained deposits crystals of alum, which may be made "to undergo the usual "process of washing and roaching."

"Had the above process been performed with the salts of soda" and soda felspar, "a soda alum would have been formed." The watery solutions from boiling the glass-like substances above, if saturated with carbonic acid, the silica precipitates, and on drying the mass in a furnace it "becomes insoluble," and by lixiviating the mass a solution of "sesqui-carbonate of potash or "soda" is obtained, which is evaporated; or the boiling solution of silicate of potash or soda filtered through a bed of lime, caustic potash or soda results, and may be converted into carbonate.

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 2 (*enlarged series*), p. 11; London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 249.]

A.D. 1842, October 13.—N° 9492.

KAGENBUSCH, PETER.—"Certain improvements in the treat-" ment of the alum rock or schist, and in the manufacture and " application of the products derived therefrom." These are, first, "treating the alum rock of schist by subjecting it to a pro-" cess of decomposition in closed heaps."

Second, "burning the alum schist" decomposed as above "in " kilns or heaps formed to act as kilns." Wood or coal, but " turf or moorland parings" in preference is laid "on the floor " of the kiln about a foot in thickness, the turfs being set edge-" ways and arranged so that the air may circulate through the " kiln." The schist is piled two or three feet deep upon the fuel, and "the turf is then set fire to, and the combustion is regulated " by air holes in the kiln, so as to be as slow as possible; as the " matters in the kiln sink they are renewed until the kiln is filled " up, when a covering of clay" is put on and the air holes stopped.

Third, burning alum schist as above "with turf or moorland " parings."

Fourth, "lixiviating the alum schist together with such an ad-" mixture of kelp as will furnish the alkaline base," so as to form alum by evaporation and crystallization.

Fourth, "the manufacture of artificial pouzzolana and hydraulic " cement." The exhausted schist is ground and calcined, and further ground, is mixed with lime, and made into bricks or balls, which are dried and calcined.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 2 (*enlarged series*), p. 235; Mechanics' Magazine, vol. 38, p. 392.]

A.D. 1842, October 20.—N° 9496.

LONGMAID, WILLIAM.—"Improvements in treating ores and " other minerals, and in obtaining various products therefrom, " certain parts of which improvements are applicable to the manu-" facture of alkali." These are, "treating ores and minerals " containing sulphur, to obtain various products therefrom, by " applying common salt" in the proportions, at least, of sixty of common salt to "forty of the ascertained quantity of sulphur " contained in the ores or minerals." Employing in preference for the above purpose "a reverberatory furnace, having four beds, " each succeeding bed being on a somewhat higher level in pro-

" ceeding from the fire towards the end of the furnace." "The " ore or mineral with salt," are introduced at the highest bed, " and as the ores operated on" "require more heat to separate " the sulphur, they will progressively be brought on to a hotter " bed of the furnace." The ash lixiviated with water "affords a " solution containing sulphate of soda, chloride of sodium, and " salts of copper." Iron separates copper in the metallic form, lime throws it down as an oxide; the solution is evaporated for sulphate of soda, which crystallizes on cooling and standing. The mother liquor may be further evaporated and set aside to crystallize, or may be evaporated with lime and the residue treated with " carbonaceous matter previous to turning down to the lower " bed of the black ash furnace."

[Printed, 8*d*. Drawing. Repertory of Arts, vol. 2 (*enlarged series*), p. 31; London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 274; Mechanics' Magazine, vol. 39, p. 427; also vol. 64, p. 610. Extension applied for, but not granted.]

A.D. 1842, October 27.—N° 9501.

MULLINS, John.—" Improvements in making oxides of metals, " in separating silver and other metals from their compounds " with other metals, and in making white lead, sugar of lead, and " other salts of lead and salts of other metals." These are, first, " manufacturing of oxides of lead and of other metals " by passing currents of air or " oxygen gas or other suitable æriform matter " below the surface of or through the metal when in a melted " state, at the temperature of their respective points of oxidation, " whereby, in the case of lead, silver is accumulated, and rendered " more easy of separation."

Second, "acting on oxide of lead so formed" by the vapour of vinegar and carbonic acid gas, and making white lead. The oxide is exposed on trays in a chamber, and the vinegar or acetic acid is distilled into the chamber, while carbonic acid gas enters it by another pipe.

Third, "exposing a solution of acetate of lead or other suitable " salt of lead made from oxide of lead so formed" to an atmo- " sphere of carbonic acid gas." Sponges surrounded by jars are suspended by worsted strings from a vessel containing a solution of acetate, and "by capillary action the sponges are kept con- " stantly moist by a supply of the solution descending down the " worsted strings," and the jars are filled with carbonic acid gas.

Instead of the sponges, a frame of wood with cloth on it is substituted, and the solution is supplied "by capillary attraction or by " a dropping apparatus."

Fourth, applying "common soot to deoxidize the oxide of " lead" so formed, and generally in the reduction of ores or oxides.

Fifth, applying "magnets to separate the iron from oxide of " lead" so formed.

[Printed, 10*d*. Drawing. London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 352; Mechanics' Magazine, vol. 38, p. 488; Engineers' and Architects' Journal, vol. 6, p. 303; Artizan, vol. 1, p. 147.]

A.D. 1842, December 15.—N° 9558.

SAUTTER, CHARLES MAURICE ELIZEE.—(*A communication.*)— " Improvements in the manufacture of sulphuric acid." These are, the waste gases or vapour "from a sulphuric acid chamber " are caused to be acted on by sulphuric acid or other matter, so " as to absorb the nitrous vapours therefrom in order to their " being again used." The air which escapes from the lead chambers is brought into contact with sulphuric acid of about 56° Baumé, to deprive it of moisture, and afterwards with stronger acid, by which the nitrous vapours are absorbed; this acid is brought "into the tube which first receives the products of the " combustion of the sulphur, when the acid gives up a great portion of its nitrous vapours, but in order to carry off the whole " of it, a current of steam is brought at the same time into the " tube." Alkaline solutions may be employed to absorb "the " nitrous vapours, thus forming a salt which, after evaporation," is decomposed by sulphuric acid giving off "nitrous vapours for " the manufacture of sulphuric acid."

[Printed, 10*d*. Drawing. Repertory of Arts, vol. 2 (*enlarged series*), p. 92.]

A.D. 1842, December 22.—N° 9569.

KNELLER, WILLIAM GODFREY.—" Improvements in the " manufacture of soda, in the evaporation of brine, and in the " concentration and manufacture of sulphuric acid."

These are, first, a metal evaporating pan having a steam case or jacket; the steam under pressure escapes with difficulty at the opposite end. There are a number of pipes through the steam case which " deliver streams of compressed air into the fluid to be

" evaporated. In the case of a rough soda solution the carbonic " acid in the compressed air precipitates from it the sulphur, lime, " and other impurities," converting it into carbonate.

Second, in " evaporating brine, the salt in crystallizing falls to " the bottom" of the pan and is raked out " in the usual manner."

Third, in manufacturing sulphuric acid blowing " streams of " compressed air," upon " the mixture of sulphur and nitre " whilst it is burning in the furnaces connected with the " leaden chambers."

Fourth, " concentrating sulphuric acid contained in leaden or " earthen vessels" by introducing compressed air by tubes into the " containing vessels." The air is passed " through gauze " or other suitable material," to prevent " matters from entering " to discolour the sulphuric acid."

[Printed, 6*d*. Drawing. London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 32.]

A.D. 1843, January 12.—N° 9586.

RODGERS, Julian Edward Disbrowe.—" Certain improvements in the separation of sulphur from various mineral substances." These are, " the direct application of protoxide of " hydrogen or water," in preference " in the form of steam, in " the calcination or roasting of the ores of silver, copper, iron, " zinc," &c. for " the more complete separation of the sulphur " from those ores." The gases separated in this way may be burnt, or may be collected and burnt, and the sulphurous acid converted into sulphuric acid or burnt with a limited portion of air; the hydrogen forms with the oxygen of the air water " while " the sulphur is separated and condenses in a pure state."

[Printed, 6*d*. Drawing. London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 7; Mechanics' Magazine, vol. 39, p. 428.]

A.D. 1843, March 24.—N° 9676.

WALTERS, Gregory Searle.—(*A communication.*)—" Improvements in the manufacture of chlorine and chlorides, and " in obtaining the oxides and peroxides of manganese in the " residuary liquids of such manufactures." These are, first, " manufacturing chlorine and chlorides by combining the use of " sulphuric acid with muriatic acid and with manganese in equivalent proportions, whereby the muriatic acid will be converted

" into chlorine or chlorides and the manganese into sulphate of " manganese." The chlorine is converted into chlorides " in the " ordinary manner."

Second " manufacturing oxides and peroxides of manganese" from the sulphate of manganese obtained above. The solution of the sulphate is mixed with scrap iron, the oxides and peroxides precipitate and sulphate of iron is in solution, or the sulphate of manganese evaporated to dryness, and the residue calcined with admission " of a small quantity" of air. Manganese is obtained and the sulphurous acid evolved may be converted into sulphuric acid.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 2 (*enlarged series*), p. 368; Mechanics' Magazine, vol. 39, p. 429.]

A.D. 1843, May 22.—N° 9734.

SAUTTER, CHARLES MAURICE ELIZEE.—" Improvements in " the manufacture of borax." These are as follows:—Dry boracic acid and " carbonate of soda crystallized," both in powder, are mixed together in certain proportions and exposed in layers to a temperature of from " 90° to about 115° F." They are stirred occasionally, and in " twenty-four to thirty-six hours the carbonic " acid is all evolved from the carbonate of soda and the operation " complete."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 3 (*enlarged series*), p. 116; London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 349.]

A.D. 1843, May 25.—N° 9743.

GIBSON, JOHN BUSHBY.—" Certain improvements in the " manufacture of salt." These are, first, " constructing salt pans " of such a depth" " at the flue end, where the salt chiefly falls," so " that the operation may be continued for a time limited only " by that depth."

Second, " converting coarse grained salt into fine" by " pulverizing or pounding the same."

Third, " the passing of the brine through hot air, whether this " is effected by the brine falling freely through the hot air" or " by any equivalent method, such as the ejection of the brine in " jets into the midst of the hot air, or the conducting of it through " it by means of pipes."

Fourth, conveying "steam, hot air, or hot water through the "brine by means of pipes which can be removed and replaced at "pleasure, instead of being fixed."

Fifth, preventing "of the formation and accumulation of pan "scale" in that part of the apparatus exposed to the fire by making that part of metal tubes of any form, preferring cylindrical.

Sixth, constructing the salt pan bottoms of metal plates "either "flat or arched or partly flat or partly arched."

Seventh, "supplying pans with heated brine during the process "of evaporation." Immediately over the fire is a pan with a well furthest from the fire, for salt to deposit in; a valve opens from this pan "into a trough" "perforated with holes through which "the brine falls on to a heated flue or tube immediately under, "where it remains until converted into salt."

[Printed, 1*s.* 2*d.* Drawings. Mechanics' Magazine, vol. 39, p. 465.]

A.D. 1843, May 30.—N° 9748.

NEWTON, WILLIAM.—(*A communication.*)—"Certain im-"provements in obtaining copper from copper ores, some parts "of which improvements are applicable to obtaining certain "other metals contained in some copper ores." These are, generally, calcining what is called "sulphuret materials," by which means they are converted into sulphates, and these again are converted into the metallic state. The material, after being calcined, is called the "sulphate material," and is generally lixiviated with "sulphuric acid mixed with water." In reference especially to this subject sulphuric acid is sometimes obtained by decomposing sulphates of copper and iron obtained as above by exposing "these sulphates in retorts or ovens made of fire-clay or brick "work to a strong red heat," and "thus distil off sulphuric acid "from these sulphates, and "condense this acid in suitable "vessels." The residue is "oxides of copper and iron, and "usually sub-sulphates of copper and iron," and is used "in "place of sulphate of copper to melt with 'sulphuret material,' "for the purpose of obtaining coarse copper," using "about two "parts of this residuum" in "place of one part of sulphate of copper.

[Printed, 6*d.* No Drawings. London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 325.]

A.D. 1843, June 10.—N° 9764.

DUCLOS DE BOUSSOIS, Edouard Joseph Francois.—"Improvements in the manufacture of lead, tin, tungsten, copper "and zinc, from ores and slags, and other products, and in the "manufacture of their alloys with other metals." These are, in reference to this subject, first, when sulphurous ores are heated in large kilns, "a large proportion of the coal and labor required "in the ordinary treatment are economized, and the sulphurous "acid gas and sulphuric acid formed in the operation irretrievably "lost in the ordinary method are made applicable to the manufacture of sulphur, or sulphuric acid."

Second. When tin is to be obtained from slag, the slag is mixed with lime, limestone, or other flux, and calcined in a furnace; the metal obtained is dissolved in muriatic or sulphuric acid leaving untouched any tungsten. The tin is precipitated either in the metallic state by the use of zinc, or as a sulphuret by sulphuretted hydrogen, which is afterwards reduced to the metallic state. In manufacturing copper from ores, slags, &c., the ores are calcined, and the carbonates or oxides of copper are saturated with sulphuric acid, and the sulphates dissolved out, and the solutions concentrated, and the copper precipitated by metallic iron, sulphuretted hydrogen, &c. "The sulphates of metals left after the "treatment can be concentrated and crystallized" after the usual manner.

"The best manner of producing sulphuric acid," and which in preference is employed, is as follows:—Using "a large "prismatic kiln susceptible of holding from five to ten or twenty "tons of either sulphurets of iron, copper, zinc, or other metals, "the air to which" is supplied and regulated by the action of a blast of air produced at a pressure above that of the atmosphere. Sulphurous acid is produced at a temperature sufficient to decompose the nitrates, and both sulphurous and nitrous gases are "forced in the same pipe, and proper quantities of steam "introduced, sulphuric acid would be produced in a very economical manner," and is thus forced under the calcined ores so as to form sulphates as above described.

Third. In the manufacture of alloys of tin and tungsten, and of zinc and tin, the proportions are given, "as regards the manufacture of alloys of zinc and copper." "The ores of zinc "being well and thoroughly calcined, and mixed with carbon-

"aceous matters," are placed in large pots, &c., about half filled; a perforated tray of the same material as the pot is fitted exactly into it. On this tray is "the necessary quantities of feathered "copper, or other as will be required to form the alloy, prevent-"ing the contact of the ores of zinc and flux with the copper "during the reduction treatment; the vessel is closed and the "process carried on as in the manufacture of zinc alone." "The "fumes of zinc when the reduction takes place, combine with "the copper in a regular and constant proportion, and the oxides "of zinc escaping can be condensed as in the manufacture of zinc." The remainder refers to the formation of alloys.

[Printed, 10*d*. Drawings. London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 101.]

A.D. 1843, July 13.—N° 9832.

LAMING, Richard.—"Certain improvements in the purification "and application of ammonia to obtain certain chemical pro-"ducts." These are, first, instead of adding mineral acids to gas liquor, adding a solution of muriate of lime; the carbonate of lime precipitates, and the clear liquid boiled for an hour is agitated with "hydrated oxide of iron to combine with all the sulphuretted "hydrogen," lime added to saturate the muriatic acid. "The "solution is finally distilled."

Second, "making of prussic or hydrocyanic acid on a scale of "commercial magnitude" by passing ammonia through a vessel containing red-hot charcoal.

Third, "the use of prussic acid so made for making" prussiates, &c.

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 107; Engineers' and Architects' Journal, vol. 7, p. 38.]

A.D. 1843, October 18.—N° 9912.

GRAHAM, James.—"Improvements in the construction of pots "or vessels and furnaces used in the manufacture of zinc and in "other manufactures, and also improvements in the treatment "of the ores of zinc in the process of manufacturing zinc." The improvements which relate to this subject are, first, "the roasting "or calcining that zinc ore which is called blende," and "that "zinc ore which is called calamine," so as to obtain sulphuric acid from the former and carbonic acid from the latter "during

" the process of such treatment in the manufacture of zinc." The blende is reduced to pieces about the size of a pea and roasted " in close vessels having a small access of air;" the sulphurous acid gas is passed into a sulphuric acid chamber. The furnaces may be " similar to those in which iron pyrites are burned," but in preference they are constructed with a double set of shelves heated by a coke oven, the flues passing up each of their sides. The ores are " laid on the shelves of the furnace to the " thickness of about two inches, and stirred by passing a rake " or bar through the holes through which the air passes to supply " the combustion." The calamine is treated in the same way as the blende, and " the carbonic acid gas can be passed into a " chamber" for use.

[Printed, 2*s*. 8*d*. Drawings. Repertory of Arts, vol. 5 (*enlarged series*), p. 1; Mechanics' Magazine, vol. 40, p. 318; Engineers' and Architects' Journal, vol. 7, p. 199.]

A.D. 1843, November 2.—N° 9920.

STAGG, JOSEPH DICKINSON.—" A new and improved plan for " collecting, condensing, and purifying the fumes of lead, copper, " and other ores and metals, and also the particles of such ores " and metals arising or produced from the roasting, smelting, or " manufacturing thereof; and also the noxious smoke, gases, " salts, and acids, soluble and absorbable in water, generated in " treating and working such ores and metals." This consists in attaching "to the flue or chimney into which are conducted the " fumes, gases, &c." a "strong air-tight cistern or vessel" containing water; a pipe from the flue or chimney conducts the gases, &c. nearly to the bottom of the chamber; a pipe from the top at the other end of the cistern is "connected with one or " more air pumps or exhausting machines, to be worked by a " water-wheel, steam engine, or other power." In preference there are partitions in the cistern or vessel. "These partitions " must alternately reach from the bottom of the cistern to within " such a distance of the top" as will allow a proper space for the passage of the smoke, &c., and from the top of the cistern to within a like distance of the bottom. "The purified vapours and " such gases, &c. as are unabsorbable or not soluble in water " passing from the cistern or vessel into the air pumps or other " exhausting machines, are forced therefrom into an eduction

" pipe or flue." When the water is sufficiently saturated it is run into vessels, allowed to settle, "and whatever valuable salts, " acids, or other products" held in solution, are obtained by evaporation. &c.

[Printed, 6d. Drawing. Engineers' and Architects' Journal, vol. 7, p. 196.]

A.D. 1843, December 5.—N° 9974.

NEWTON, William.—(*A communication.*)—" Improvements in " extracting certain metals from ores and other compounds of " these metals, some part or parts of which improvements are " also applicable to obtaining another product or other products " from such ores or compounds."

These are said to be, first, the calcining of "the sulphurets of " copper and iron, or of lead or zinc," by " means of an apparatus " which provides for effecting such calcination without exposing " the ore or compound to flame, or heated air produced by the " combustion of fuel, and which also provides for obtaining the " gas produced by such calcination unmixed with smoke; and " which also provides for introducing the ore or compound first " into that part of the apparatus employed which is the least " heated, and afterwards into other parts of the apparatus which " are more heated, and in which the required calcination is completed." The ores are fed in by hoppers at the top into the calcining furnace, and as they get calcined from the heat from the smelting furnace below, they are gradually moved on to it and are finally smelted in it.

Second. "The adapting of such a calcining apparatus" "to a " smelting furnace," thus applying "the waste heat of this " furnace" to "calcine the said ores or compounds, and so that " the calcined ore or compound may be transferred in a heated " state directly from such calcining apparatus to the smelting " furnace."

Third. "The obtaining of sulphur either by causing such " sulphurous acid gas as is produced free from smoke, during the " combination of the said ores and compounds, to percolate " through coke or coal heated to redness, and causing the gases " thereby produced to be mixed in such a manner and at such a " temperature as to provide for their acting upon each other, so " as to produce free sulphur; or by causing such sulphurous acid " gas together with such gas containing carbon and hydrogen, or

" either of them," to " be heated to redness, and to be mixed in " such a manner and at such a temperature as provide for their " acting upon each other, so as to produce free sulphur," which is collected in a filtering apparatus, or by the apparatus ordinarily in use " for collecting the finely divided carbon called lamp black." The part of the chamber " under which the fire is placed is filled with pieces of fire-bricks or other suitable materials, which should " be heated to a full red heat by means of the fire, and the gases " being caused to percolate through the said materials become " thereby heated and partly mixed." There are brick partitions throughout this chamber, with apertures between them, " so " arranged as to cause the direction of the currents of gases " passing through the vessel or chamber, and through these " apertures, to be repeatedly changed," so as to " complete their " action upon each other, and to produce free sulphur." The sulphurous acid is also decomposed by passing it through heated retorts or tubes of fire-clay, preferred to be filled with pieces of bricks, &c., along with " gases containing carbon and hydrogen, " which are produced by decomposing coal or coal tar by heat, " also those which are produced by the action of water on ignited " coal or coke and sulphuretted hydrogen gas, however this gas may " be procured."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1843, December 13.—N° 9985.

NEWTON, Alfred Vincent.—(*A communication.*)—" Improve- " ments in the manufacture of cyanogen and its compounds, par- " ticularly the prussiates of potash and soda." These are, " the " application of nitrogen gas obtained from the atmosphere or " from the waste gases of sulphuric acid chambers to the manu- " facture of cyanogen and its compounds, in whatever way or by " means of whatever arrangement of apparatus the same may be " applied." A clay or other retort capable of sustaining a white heat, open at top and bottom, is supported in a furnace; the lower end of the retort rests on a second retort or refrigerator made of cast iron; its form is elliptic, as is the clay retort. At the bottom of this is an extractor; below this is " an extinguisher or dip pipe, " the mouth of which plunges into a receiver containing a saline " solution which acts as a hydraulic valve and closes the apparatus " completely." The waste gases are drawn by an air pump or some such machine through a solution of a salt of iron, by a pipe attached to the dip pipe a little below the extractor. In preference, the carbonates of the alkalies are employed, and the charcoal is soaked or steeped in a strong solution of the same, and dried and fed in continuously into a series of retorts as above. The air before entering the retorts may be "passed through a mass of burning " coal or coke, so as to deprive it of its oxygen before it is supplied " to the alkalized charcoal." "There should alway be a slight " excess of iron or ferro salts in the receiver." The extractor "is " worked periodically by an attendant for the purpose of conveying " the cyanized charcoal into the extinguisher," and into the saline solution in the receiver. The liquors from the receiver are evaporated and the prussiate crystalized, &c.

[Printed, 1*s*. 4*d*. Drawings. London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 380.]

A.D. 1843, December 13.—N° 9986.

SYLVESTER, John.—"Improvements in applying heat to brine " or other matters contained in vessels." These are, "heating " brine and other matters in vessels by applying a column of fluid " so that it may act by its pressure on the fluid medium with " which it is connected and to which the heat is to be applied, in " combination with other apparatus," in "such manner as to " obtain and maintain desired temperatures above 212° F., without " subjecting the vessels employed to greater pressure than is due " to the column of fluid." The vessel containing the brine, &c. is placed within another vessel, and the space between them about two or three inches contains "the fluid employed, on which the " columns of fluid exerts the required pressure, and under the " outer vessel is placed a suitable furnace or fire-place for heating " the fluid between the vessels." "A column of thirty-two or " thirty-four feet high will allow of a temperature of about 250° F " being maintained."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 4 (*enlarged series*), p. 57; London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 189; Mechanics' Magazine, vol. 41, p. 125; Engineers' and Architects' Journal, vol. 7, p. 239.]

A.D, 1844, January 1.—N° 10,002.

DENOON, Alexander.—"Improvements in the mode of " making carbonate of soda."

[No Specification enrolled.]

A.D. 1844, January 1.—N° 10,003.

DENOON, Alexander.—" Improvements in the mode of " making muriate of ammonia."

[No Specification enrolled.]

A.D. 1844, January 1.—N° 10,004.

LONGMAID, William.—" An improvement in the manufac- " ture of copper, tin, zinc, and peroxide of iron."

These are, first, in the manufacture of the above metals, " causing " ores containing those metals with sulphur to be treated with " common salt, in proportion of less than sixty by weight of " common salt to forty by weight of the sulphur ascertained to be " in these ores." It is preferred to use the furnace described in N° 9496. The mass lixiviated, the solution contains metallic matters " according to the nature of the ores operated on, toge- " ther with sulphate of soda," &c. The copper is separated by iron and the zinc by lime, " associated with an excess of lime and " with some oxide of iron."

Second, treating the residue undissolved after fusion and lixiviation with dilute muriatic acid, condensed in the above process or otherwise.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 4 (*enlarged series*), p. 97; London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 22.]

A.D. 1844, January 16.—N° 10,017.

WATSON, William, junior.—" Improvements in the manufac- " ture of sulphate, of muriate, and other salts of ammonia."

These are, first, " evaporating ammoniacal liquor or gas water " in close vessels, and passing the vapour of such liquor through " an acid solution so as to produce the required salt;" " a " quantity of slacked lime may or may not be added at the dis- " cretion of the operator."

Second, " in evaporating in close vessels the ordinary mixture " of ammoniacal liquor and acid, and condensing the vapors " by " passing them through pipes or vessels kept cold by an external " application of cold water," as in a worm tub, or " by passing " such vapours through a stream or body of cold water."

[Printed, 10*d*. Drawing. London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 83.]

A.D. 1844, March 11.—N° 10,097.

TURNER, Wilton George.—"The manufacturing of salts of "ammonia and compounds of cyanogen from a substance never "before applied to that purpose."

These are, first, "the use of guano for the production of salts "of ammonia and compounds of cyanogen" by distilling the guano at a low red heat in a close vessel, condensing with water in "a Woulfe's apparatus," adding to the solution "protomuriate "of iron" and muriatic acid, when Prussian blue precipitates. The precipitate boiled with an alkali, the solution will yield crystals of the ferrocyanate of the alkali on evaporation and crystallization. The solution from the Prussian blue yields sal-ammoniac.

Second, "the use of guano instead of other animal matters" formerly used "in the manufacture of compounds of cyanogen," "the adaptation of guano to this process by the admixture there-"with and use of tar, coal, or other carbonaceous matters."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 14 (*enlarged series*), p. 246; London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 263.]

A.D. 1844, March 20.—N° 10,116.

COOKSON, William Isaac.—"Improvements in apparatus "for burning sulphur in the manufacture of sulphuric acid." These are, "arranging apparatus for burning sulphur in the ma-"nufacture of sulphuric aid, whereby the heat obtained therefrom "may be applied to a steam or other boiler or vessel for generating "steam, or for boiling, evaporating, or concentrating fluids." "These are, burner plates, and the doors of the flues in which they "are placed are similarly constructed to those heretofore em-"ployed," and "the process of sulphuric acid making is carried "on in the ordinary manner," only vessels, &c. for evaporating, &c. are in the place of the usual brick arches.

[Printed, 6*d*. Drawing. Repertory of Arts vol. 4 (*enlarged series*), p. 345.]

A.D. 1844, March 28.—N° 10,121.

POLLARD, William.—"Certain improvements in the manu-"facture of ammonia and its compounds."

[No Specification enrolled.]

A.D. 1844, May 30.—N° 10,207.

LEE, John.—" Improvements in obtaining products from sul-" phurets and other compounds containing sulphur." These are, first, " the passing of sulphurous acid gas through and amongst " coke, coal, or other carbonaceous matter heated to a full red " heat to obtain sulphur, when such sulphurous acid gas is " obtained by burning sulphuretted hydrogen gas with atmos-" pheric air, when the sulphuretted hydrogen gas is produced " from the sulphurets of potassium, sodium, calcium, or alkali " makers' waste."

Second. " The mode of constructing the furnace," whereby the gaseous products " are caused to be passed amongst and through " heated carbonaceous matter, whereby the gaseous matters are " submitted to the heated carbon without passing through between " the grate bars supporting the heated carbonaceous matters." A flue convey the sulphurous acid gas whence it is generated through a fire-brick grating into the fire-place, and a series of flues conveys the gases, &c. into a chimney or flue, " constructed " of common brick or stone cased inside with fire-brick." In the interior of the walls, which are of great thickness, is an open space filled " with ground coke or furnace ashes, or any other " suitable material that is a bad conductor of heat." A series of brick arches or fire tiles are thrown across the chimney or flue and " placed about two inches apart, upon which are piled fire-bricks " or fragments of fire-bricks, constructed in a way to form tor-" tuous passages for the sulphur vapour and gaseous matter to " traverse." The sulphur vapour passes to a condenser filled with broken glass, bricks, stones, or coke, and from thence into an iron pan, and ultimately into moulds.

[Printed, 10*d*. Drawing. Repertory of Arts, vol. 5 (*enlarged series*), p. 20.]

A.D. 1844, June 1.—N° 10,209.

NOAH, Walter, and NOAH, John.—" Improvements in the " manufacture of salt, and in apparatus to be used therein." These are, first, " a boiler " " placed in the front of the fine salt " pan " and " connected with the broad salt pan " so as to supply steam and heated water under it.

Second. Three chambers situated on each side and between the two furnaces, with their communicating pipes leading into the double bottom and sides of the reservoirs so as to convey the heat to them; from thence it passes off by an escape pipe.

Third. "The mode of applying heated air to the purpose of "heating the brine in the reservoir."

[Printed, 10*d*. Drawing.]

A.D. 1844, June 12.—N° 10,227.

SWINDELLS, John.—"Several improvements in the prepara- "tion of various substances for the purpose of dyeing and pro- "ducing color, also improvements in the application and use of "several chemical compounds for the purpose of dyeing and "producing colour not hitherto made use of." These are, in reference to this subject, preparing for dyeing blues and similar colors the compounds of cyanogen and ammonia. My first improved method consists in "preparing a substitute for the hoof "and horn, and other animal materials usually made use of. This "I accomplish by grinding to a fine powder or paste common "coal, cannel, coke, or charcoal, or any other carbonaceous "matter, and mixing therewith a solution of gelatine, albumen, "or a mixture of each, and then thoroughly drying the com- "pound." "My second method consists in passing the nitrogen "of the air (which has or has not been deprived of its oxygen by "combustion, and the resulting carbonic acid by lime), or the "protoxide, deutoxide, or nitrous vapour through charcoal or any "carbonaceous matter previously saturated with potass or soda, "kept at a full red, or approaching a white heat, in a perfectly "close retort, or any other convenient apparatus, until the re- "quired quantity of cyanide is produced. If ammonia is to be "produced I pass the nitrogen gas, together with one-fourth its "volume of steam or aqueous vapour (with or without the addi- "tion of atmospheric air), through charcoal or other carbonaceous "matter at a red heat, and condense the ammonia so produced by "the usual process." "In forming ammonia or its compounds "from the oxides of nitrogen or nitrous vapour I pass them, in "conjunction with their own volume of steam, through charcoal "at a red heat, either in close or open vessels; but if a com- "pound of carbon and nitrogen, namely, cyanogen, is to be pro- "duced, the apparatus containing the heated carbonaceous matter "must be air tight."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 5 (*enlarged series*). p. 43; London Journal (*Newton's*), vol. 27 (*conjoined series*). p. 108.]

A.D. 1844, August 6.—N° 10,288.

GREENSHIELDS, Thomas.—" Improvements in the manu-" facture of salt." These are, first, "withdrawing the steam " (from a covering forming a chamber to collect it) that rises " from the brine in making salt to accelerate the evaporation." This is effected by means of a fan blowing machine.

Second, " a method of using the steam so withdrawn to make " salt or heat brine." The steam is forced under pressure through a pipe.

Third, " preventing currents of cold air from entering between " the bottom of the pan and the wall," by means of an arrangement which forms " what is termed the water butt."

[Printed, 10*d*. Drawing. Repertory of Arts, vol. 5 (*enlarged series*), p. 142.]

A.D. 1844, August 22.—N° 10,293.

TURNER, Wilton George.—" An improved mode of dividing " the passage of and otherwise dealing with noxious vapours and " other matters arising from chemical works in certain cases." This consists, first, in "the application of a screw and arms work-" ing in water, the one for the purpose of creating and increasing " the draft from, and the other for wetting and thus condensing " by increasing the specific gravity of, noxious vapours proceed-" ing from furnaces in which the roasting and smelting of " metallic ores and other metallurgic processes are being carried " on."

Second. "The application of the said screw or of air-pumps and " condensers" in the manufacture of sulphuric acid, muriatic " acid, and sulphate of soda." There are three condensers, one leading into the other, to the last of which are attached air-pumps. The draft pipe of the sulphuric acid chamber leads into the bottom of the first condenser, in which is a quantity of what is usually called chamber acid, so as to cover the opening of the draft pipe to the depth of from two or three feet and connect it, or it with the other two condensing chambers with the air-pumps. Plates of lead set diagonally in these condensers causes the gases to move diagonally through them.

Third. Substituting " (in the manufacture of sulphuric acid) of " nitric acid to the sulphuric acid in the acid chamber for nitre " in the furnace."

Fourth. "Substituting a shallow sulphuric acid chamber," "of "such an area as may be requisite, but not more than two feet in "depth, above the surface of the chamber acid, the depth of the "latter being about a foot."

Fifth. "The working the vapours in and escaping from the "acid chamber through the condensers with the condensing "media." The first two condensers are heated to about 140° F. by means of a steam pipe, and are charged with acid of sp. gr. "1·5 to 1·6, to which has been added three or four per cent. of "nitric acid," and the condenser nearest the air-pumps with sulphuric acid of sp. gr. 1·7, and the sulphuric acid chamber luted with the same acid as is in the first two condensers. The air pumps "may now be set in motion, and the sulphur burnt as usual in "the furnace, but without the usual addition of nitre, the fumes "entering as usual into the sulphuric acid chamber," and, "passing "over the surface of the chamber acid, are absorbed and converted "into sulphuric acid; some portion, however, of the sulphurous "acid escaping condensation passes through the draught pipe" into the first condenser, "where it is at once, in coming in contact with the nitric acid, converted into sulphuric acid," with the evolution of "deutoxide of nitrogen," which becoming nitrous acid from the oxygen of the air passes into the second condenser, where it is absorbed.

[Printed, 1*s*. Drawing. Repertory of Arts, vol. 5 (*enlarged series*), p. 371; Mechanics' Magazine, vol. 43, p. 12; London Journal (*Newton's*), vol. 26, (*conjoined series*), p. 337.]

A.D. 1844, August 29.—N° 10,296. (* *)

DE SUSSEX, François Stanilas, and ARROTT, Alexander Robertson.—"Improvements in the recovery of manganese used in making bleaching powder." The patentees apply their invention "to the conversion of all oxides and the "carbonate and other combinations of manganese whatsoever, "whether native or factitious, which contain the metal in an "inferior state of oxidation, into a superoxide of manganese "adapted to produce chlorine or oxygen gas." The "chlorides, "sulphate, sulphuret, or carbonate of manganese," may be converted into "sesquioxide or deutoxide of manganese" as follows:—First, by subjecting "dried chloride of manganese to a strong "heat, produced either by the united action of burning fuel & a "jet or jets of an oxyhydrogen flame or of a stream of atmospheric air thrown upon the burning fuel by a fan or other "suitable impulsive power." Secondly, by heating the chloride to an intense heat in "a retort made of fire-clay." Thirdly, by heating the chloride with "lime" or "carbonate of lime," or "magnesia." "Sulphate of manganese" may be decomposed, so as to obtain from it an oxide of manganese to be afterwards peroxidized by heating a mixture of it to a strong calcining heat in a retort with any suitable combustible matter in proper proportions. The sulphuret so formed is reduced by means of a second heating in an open retort. "All the lower oxides or carbonates of "manganese, whether natural or factitious," may be converted into "superoxide," fit for affording chlorine, as follows:—First, by heating in a reverberatory furnace a mixture of the oxides or carbonates with such alkaline matter as potash or soda. The resulting fused mass, on being dissolved in water and exposed to the air, becomes decomposed by the absorption of carbonic acid gas, and peroxide of manganese is precipated. Carbonic acid artificially applied, or alkaline bicarbonates, or various organic products hasten the above decomposition. Second, by heating a mixture of the oxide or carbonate with a suitable proportion of lime; or by treating the sesquioxide with one-half of an equivalent of aqueous ydrochloric acid; or by passing chlorine through sesquioxide in a moist state. Third, by passing "deutoxide of azote" over the surface of the oxide or carbonate in a moist state.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 5 (*enlarged series*), p. 323; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 140.]

A.D. 1844, September 19.—N° 10,320.

BIRKMYRE, William.—"Certain improvements in the manufacture of potash and soda alums, sulphuric acid and sulphate "of soda." These are, "forming a compound of sulphuric acid with "the alumina, potash, or soda, of clays, albite, or felspar, either "by the action of heat and sulphuric acid, alone or combined with "a salt of potash, or soda in vessels contained within sulphur "burners or kilns used in the process of manufacturing sulphuric "acid." A certain quantity of powdered nitrate of potash is mixed with a certain quantity of powdered dry Cornish clay. So much of this mixture, together with sulphuric acid, is mixed in a nitre pot and introduced into a pyrites kiln at stated periods "a "few inches above the burning sulphur." In about four hours the product in the nitre pot is "a species of burnt alum," and is lixiviated with a certain quantity of sulphuric acid of a certain gravity, and the solution separated and the alum crystallized. For soda alum nitrate of soda is substituted for nitrate of potash; the proportions in which the acid and nitrate of soda are used differ. The soda alum solution may be decomposed by adding "acid sul-" phate of potash (salenixum) into potash alum and acid sulphate "of soda. The latter should be run off into a reverberatory "furnace" and converted "into sulphate of soda" by adding so much chloride of sodium and heating.

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 254.]

A.D. 1844, September 26.—N° 10,331.

TURNBULL, ALEXANDER.—"A new mode or method of more "expeditiously and effectually tanning hides and skins and of "separating the catechuic acid from the tannic acid in the "catechu or terra japonica used in tanning." The matters which relate to this subject are, first, "separating the japonic or "catechuic acid or other extractive or deleterious matter from the "tannic acid in terra japonica," by mixing the powdered catechues with warm or cold water, and "when cold" filtering off the liquid, which is free from "catechuic acid," &c., these substances "being insoluble in cold water."

Second, "preventing the formation or generation of gallic and "ellagic acid when oak bark, sumack, divi divi, valonia, and other "materials are used," by grinding "the materials into fine "powder" and excluding the atmospheric air "from operating "upon it during the time the process of tanning is going on."

Third, "obtaining tannic acid from the refuse or deposit of the terra japonica in purifying terra japonica" by drying the refuse at "160° F., leaving it at the same time exposed to the atmo-"spheric air and keeping it continually stirred until it assumes the "color and appearance of the original pulverized terra japonica. The material thus obtained, upon being "again subjected to fil-"tration in the same manner as the original terra japonica, will "be found to yield nearly as much tannic acid as in the first "instance."

[Printed, 8*d*. Drawing. Repertory of Arts, vol. 7 (*enlarged series*), p. 167 London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 234.]

A.D. 1844, October 22.—N° 10,362.

NAPIER, James.—" Improvements in treating mineral waters " to obtain products therefrom, and for separating metals from " other matters." These are, first, " the addition of sulphuric " acid to mineral waters containing copper and iron previous to " reduction " by iron; " the changing the solution of iron in " such waters from the per to the proto state " by adding " at the " same time with the sulphuric acid and the iron," in preference, sawdust. " Other vegetable matters will effect this, and also the " soluble portion of the refuse lime from gas works ; " and " the " obtaining the iron as a protosulphate of copperas " by evaporating the solution after the precipitation of the copper by iron, " in the usual manner," and crystallizing it out.

Second. " The treatment of the ores of copper, and of other " metals capable of being held in fusion with fluxes, by applying " to these in the fused and fluxed state a current of electricity " for the purpose of extracting such metals." A blacklead crucible is lined inside all but the bottom with clay, the regulus or calcined ore with the usual fluxes is introduced into it, and when the whole is fused a disc of iron attached to the positive wire of a battery is held " on the surface of the fused mass " and a rod " connected with the negative pole of the same battery is held " in contact with the outside of the crucible, the bottom of which thus forms the negative pole. " The metal is gradually reduced, " and deposited at the bottom of the crucible."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 6 (*enlarged series*), p. 48; London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 402.]

A.D. 1844, December 4.—N 10,416.

GAMBLE, Josias Christopher.—" Improvements in the " manufacture of sulphuric acid." These are, " the application " of the heat produced by the combustion of bisulphurets of iron " and copper in making sulphuric acid for the purpose of concentrating the said sulphuric acid and other saline solutions "; three leaden vessels are placed over the flue and " supported in " their place by bars of iron resting upon the walls of the furnace."

[Printed, 8*d*. Drawing. London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 386; Mechanics' Magazine, vol. 43, p. 79.]

A.D. 1845, February 10.—N° 10,519.

BARRATT, Oglethorpe Wakelin.—"Certain improvements " in the manufacture of acids, and in treating the noxious vapours " or gases given off from chimnies and from chemical and other " works." These are, first, " condensing the whole of the waste " gases evolved in the manufacture of sulphuric acid." The gases leave the sulphuric acid chambers by a pipe, and are conveyed into another pipe by which they are led into the sulphur furnace. When the acid chambers are small, the gases are passed through a vessel or vessels containing ammoniacal liquor or water before being passed as above to the furnace.

Second. " Condensing the acid gases evolved during the rec- " tifying of sulphuric acid." Instead of evolving them into the air they are passed into the sulphur furnace as above.

Third. " Condensing the muriatic gas evolved during the " manufacture of muriatic acid and sulphate of soda" by passing " it through vessels containing ammonia in solution or in vapour.

Fourth. "Treating the ammoniacal liquor of the gas works," by placing them in the bottom of vitriol chambers, and continuing the manufacture of the acid; when the ammonia is saturated with acid it is withdrawn and fresh liquor is supplied into the chamber as above. Or, instead of using such a chamber, the acid gases leaving the furnace are conducted "into the pits or recep- " tacles which they have at the gas works for holding the ammo- " niacal liquor, and then return from such pits by a pipe into the " air pipe," and " then into the furnace."

Fifth. " Preventing the escape of noxious vapours from the " lime which has been used for purifying coal gas," by passing acid gases through the purifiers conducting the acid gases as above.

[Printed, 8*d.* Drawing. London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 408.]

A.D. 1845, February 10.—N° 10,520.

GREGSON, John Brumwell.—" Improvements in the manu- " facture of Epsom salts, and carbonate of lime commonly called " precipitated chalk, parts of which improvements are applicable " to other purposes." These are, first, "the application of sulphuric

" acid " to " uncalcined dolamite or magnesian limestone " " for " the purpose of making sulphate of magnesia," and also obtaining carbonic acid. The limestone in fine powder is made into a paste with water, and a certain proportion of sulphuric acid added with stirring; the residuum is diffused through a large quantity of water, the sulphate of lime allowed to subside. Caustic lime or magnesia may be added to the solution of sulphate of magnesia to precipitate any iron, and the solution evaporated and crystallized in the usual manner. When the carbonic acid is required, the acid is added in a close vessel. Instead of the above, the mixed sulphates may be calcined for some hours until the whole of the iron is oxidated, and the whole treated with water as above, and the solution evaporated and " crystallized as before."

Second, applying "muriate of ammonia " " to the removal of the " lime from the mixed hydrates of lime and magnesia." A solution of muriate of ammonia is added in certain proportions to the calcined magnesian limestone slaked in a still, and a gentle heat applied until the ammonia is all evolved; it is collected by means of " a Woolf's apparatus." The residue in the still is withdrawn, the " hydrate of magnesia " is washed " to free it from muriate " of lime," and made into sulphate by dissolving in sulphuric acid, purifying it as above.

Third, making " carbonate of lime or precipitated chalk by the " application of carbonic acid gas to a solution of caustic ammonia and muriate of lime," and also by " the application of a " solution of carbonate of ammonia " to " a solution of muriate " of lime." Muriate of ammonia in certain proportions is dissolved in water, and slaked lime is added to it; " muriate of lime " and caustic ammonia are formed in the liquid." This liquid is transferred to a cylinder, and carbonic acid gas is forced into it while the liquid is agitated. The liquid is removed from the vessel, the precipitated chalk settles from it, and the solution which is muriate of ammonia may be employed over again. The chalk is washed. " Carbonate of ammonia " is made by saturating a certain quantity of caustic ammonia in a cylinder as above with carbonic acid gas, adding to the saturated solution an equal quantity of caustic ammonia of the same strength. This is mixed with a solution of muriate of lime of a certain strength, and in certain proportions. The precipitated chalk is washed.

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 175.]

A.D. 1845, February 20.—N° 10,528.

OXLAND, Robert.—"Improvements in the manufacture of chlorine." These are, "decomposing hydrochloric acid by atmospheric air." Dry hydrochloric acid gas and atmospheric air are passed into a furnace at a bright red heat "filled with pieces of porous pumicestone;" the products "chlorine associated with the undecomposed muriatic acid, and any excess of atmospheric air and nitrogen" are cooled by passing through tubes, and the hydrochloric acid separated by passing through water.

[Printed, 4*d.* No Drawings. Repertory of Arts vol. 6 (*enlarged series*), p. 251; London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 184; Engineers' and Architects' Journal, vol. 8, p. 357.]

A.D. 1845, February 20.—N° 10,530.

BROWN, George.—"Certain improvements in the manufacture of soda." These are, "fluxing the soda containing sulphuret of sodium with bodies possessing an oxidising power," employing nitrate, chlorate, or "chlorite of soda, or other body possessing an oxidising power, but in most cases" preferring nitrate. The liquor drawn from the crude soda is boiled down "until four-fifths of the salt" is precipitated, and the whole allowed to stand some time, when the red liquor is drained from it and evaporated to the "consistency of tar; the proper quantity of nitrate of soda is then added, and heat applied to expel the remaining water and flux the mass." Another mode is "to boil down the whole quantity of crude soda liquor," and when the liquor is "about the consistency of tar to add the nitrate of soda," and flux as before.

[Printed, 4*d.* No Drawings. London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 111.]

A.D. 1845, March 3.—N° 10,542.

ELLINS, George.—"Certain improvements in manufacturing salt, and in apparatus for manufacturing salt." These are, first, forming "the uppermost of the two bottoms of a double bottomed vessel or salt pan" of a series of vessels as it were, but all communicating with each other, the object being "to obtain an extended heating surface for the more effectual transmission of heat from the hot water (or the steam) which is contained in the space between the two bottoms."

Second, heating the brine to supply a vessel as above "by "causing the brine to flow in a continual stream or streams "through a long course of pipe or pipes disposed in the space "between the two bottoms of such vessel;" also by "running it "along a shallow trough of metal disposed over the flue;" also by passing it through a boiler heated by fire.

Third, "applying a flat steam vessel or vessels over the surface "of the brine in a vessel or salt pan, so as to communicate heat "to the steam arising from such brine, in order to render that "steam lighter and less liable to condensation." The vessel or vessels do not extend over the whole surface of the pans, and are supplied by steam from the space between the two bottoms.

Fourth, "forcing heated air by any suitable blowing machinery "through a pipe or pipes disposed horizontally over a vessel or "salt pan, which is covered and enclosed on all sides, in order "that such heated air may be discharged in a vertical current or "currents through a vertical branch or branches of such "horizontal air pipe or pipes beneath the lowest part or parts of "the entrance or entrances into a vertical furnace or furnaces, "which is or are provided at the highest part or parts of the "said cover over the vessel or salt pan, for the escape of the "steam arising from the brine;" "the flat vessel or vessels may "be used in combination with this mode of forcing heated air in "a vertical current or currents."

Fifth, "heating brine for the supply of vessels or salt pans "with small continual streams of heated brine, by providing "four back pans to two boiling pans, and causing the cold brine "to overflow from one such back pan into another in succession, "so as to become more and more heated within each back pan, "until sufficiently heated for supplying the boiling pans."

Sixth, "heating brine for the supply of elevated vessels or salt "pans, called upper pans, by causing such brine to flow in a small "continued stream or streams through a long course of pipe or "pipes, disposed in zigzag folds," immersed "within the afore-"said four backed pans."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1845, March 18.—N° 10,569.

DREW, Thomas, and **STOCKER**, Edward.—"Certain im-"provements in the production and manufacture of naphtha, "pyrolignious acid, or other inflammable matter." These are,

" distilling peat, peat moss, or bog earth in retorts made of stone " or iron, or of fire brick or clay," for the purpose of obtaining the above substances and ammonia.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 6 (*enlarged series*), p. 250; London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 185; Engineers' and Architects' Journal, vol. 8, p. 359.]

A.D. 1845, March 27.—N° 10,580.

TURNER WILTON, GEORGE—" Improvements in the manu- " facture of caustic alkalies, soda, and potash, and their carbonates, " and also in the manufacture of the ferrocyanates of soda or " potash."

[No Specification enrolled.]

A.D. 1845, April 2.—N° 10,586.

LIDBETTER, THOMAS, and LOUGHTON, JOHN.—" Improve- " ments in the manufacture of salt." These are, first, " the " heating of the brine in pipes by means of the heat of chambers " or spaces, beyond the fires or furnaces or fire-places used for " heating salt pans." The pipes are laid in coils in the chambers. Second, " the heating of brine passing through pipes heated by " the heat which escapes beyond the furnaces or fire-places used " for various purposes." Sometimes causing " the heated vapours " passing from such furnaces or fireplaces to be conducted by " suitable flues to a steam boiler or boilers to generate steam, such " steam being conducted by a steam pipe into a suitable vessel in " which a pipe or pipes for the passage of brine are placed " the brine thus " becomes heated before it passes into the pan."

[Printed, 8*d*. Drawing. Repertory of Arts, vol. 6 (*enlarged series*), p. 278.]

A.D. 1845, April 10.—N° 10,607.

CORMACK, WILLIAM.—" Improvements in purifying gas." The object of the first part of this invention is to employ other means than the pressure of the gas in the retort or generator to cause the gas to pass into and through any desired column of purifying liquid (say a column of two feet), thus relieving the retorts or vessels in which the gas is generated from being pressed on or influenced by the column of fluid through which the gas is forced for performing the process of purification." For this purpose the patentee employs in preference two gasometers, one of which may be filling with gas from the hydraulic main, while the other, suitably depressed, causes the gas to proceed forward through the purifiers under the increased pressure.

Second, in the application for the purpose of purifying gas of acetate of lead, acetate of iron, and acetate of baryta, muriate of baryta, muriate of lime, and acetate of lime. "A solu-" tion of 112 lbs. of brown acetate of lead in two hundred gallons " of water is placed in the usual wet lime purifier, and the gas is " caused to pass through it. The gas is then passed on to and " through a second purifying vessel containing a solution of " muriate of baryta, or muriate of lime," or acetate of lime. " The liquid from the first purifier may have added to it carbonate " of lead, when on being heated carbonate of ammonia will be " distilled over, and the acetic acid will form acetate of lead. The " deposited sulphuret of lead may be converted inio carbonate of " lead by means of lime and charcoal heated with it in a rever-" beratory furnace. In the second purifying vessel will be " formed muriate of ammonia and the carbonate of the earth used. " Another method of applying acetate of lead consists in adding " it to the crude ammoniacal liquor, such as it "comes from the " condensing mains." When "acetate of iron" is employed the acetate of ammonia so formed may be decomposed by means of " sulphate of iron," forming sulphate of ammonia and acetate of iron, to be used again in the purifier.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 6 (*enlarged series*), p. 362.]

A.D. 1845, May 3.—N° 10,652.

RADLEY, William.—"Certain improvements in the produc-" tion of gasses and for their application to purposes of general " illumination, and in the apparatus and machinery to be em-" ployed in manufacturing, measuring, and distributing the " same." These are, in reference to this subject, as follows:— " The full and complete purification" of illuminating "gasses by " dynamic condensation within close vessels, where being sub-" jected to the action of cold with several hours rest, all contami-" nations are perfectly precipitated and ready for separation." It is stated that in carrying out "that mode of purification, the " sulphureous acid gas becomes liquid like water, and therefore " easily separable from the gaseous contents of the condensors

" and gasholders at four atmospheres; cyanogen, which in the " gas burner by combustion would produce ammonia, is a liquid " at 6·5 atmospheres; and unconnected with water or its vapour, " ammoniacal gas becomes liquid at four atmospheres; chlorine " becomes liquid whilst at seven atmospheres. Water or its " vapours, and liquid cyanogen (the base of prussic acid), mutually " destroy each other; the hydro-sulphuric acid, which does not " become liquid below seventeen atmospheres, attacks and com- " bines with the free and carbonate of ammonia, producing the " solid hydro-sulphate of ammonia, which can be subsequently " dissolved by projecting water in sufficient quantity into the " condensor whose turn it is to be cleansed, and afterwards, when " an aqueous solution is effected, injecting by the same pump " atmospheric air into the interior of the condenser and saline " solutions, whereby in a few hours the whole of these nauseous " and noisome products will be converted into the harmless " sulphate of ammonia and other valuable substances." The remainder of the Specification refers to the several objects set forth in the title of the Specification.

[Printed, 2*s.* 4*d.* Drawings. See Mechanics' Magazine, vol. 45, p. 510.]

A.D. 1845, May 22.—Nº 10,684.

NAPIER, James.—" Improvements in treating mineral waters " to obtain products therefrom, and for separating metals from " other matters." These are, first, " the addition of sulphuric " acid to mineral waters containing copper and iron previous to " reduction, for the changing the solution of iron in such waters " from the per to the proto state, and the obtaining the iron as a " proto sulphate of copperas." The acid added will vary with the water, but the object is to have only " a small proportion of " free acid." The requisite quantity of old iron is put in, and in a few hours the copper is all deposited. The water " is then run " into suitable vessels, and evaporated in the usual manner and " chrystallized;" when convenient, using " the waste fire of " the smelting furnaces to evaporate the water." For reducing the persulphate of iron to the protosulphate, preferring the use of sawdust, about one pound " to every fifty gallons of the water." " When all the copper is precipitated, the water is drained off, " and " the unconsumed sawdust may be collected and used again with fresh mineral water." In all mines where such mineral waters are, there is abundance of iron pyrites, “ the roasting of “ which, with suitable apparatus, would yield the sulphuric acid “ required.”

Second. “ The treatment of the ores of copper, and of other “ metals capable of being held in fusion with fluxes, by applying “ to these, when in the fused and fluxed state, a current of “ electricity for the purpose of extracting such metals.”

[Printed, 4*d*. No Drawings.]

A.D. 1845, May 24.—N° 10,690.

CONSTABLE, John.—(*A communication.*)—“ Improvements in “ the manufacture of gas for lighting and heating.” “ This “ invention consists in manufacturing gas for the purposes of “ light and heat, by causing anthracite coal, when in a state of “ combustion, to be subjected to streams of air and steam (at “ 600° F. in preference), so as to produce gas; and when so “ manufacturing gas, the invention further consists of employing “ pearlash, together with anthracite, in order to obtain other saleable products.” “ The furnace used for this purpose may be “ similar in construction to a blast furnace employed in making “ iron from ironstone, mine, or ore, with only slight modifications, “ to adapt the same to the purpose of gas-making from anthracite coal, by applying thereto streams of air and steam.”

“ The cinder obtained, where pearlash has been used, will be “ valuable as a manure; or the cyanide of potassium may be “ obtained therefrom by repeated washings in water, and the “ solutions evaporated to obtain the cyanide of potassium in the “ solid state, as is well understood.” Or, “ in place of removing “ the cinders or ashes combined with the cyanide, as above “ explained, ammoniacal products may be obtained therefrom by “ passing steam through them, and condensing the product in “ diluted sulphuric acid or otherwise.” The gaseous oxide of carbon obtained by this process may be enriched by passing it in preference through oil of turpentine.

[Printed, 8*d*. Drawing. Repertory of Arts, vol. 7 (*enlarged series*), p. 227; London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 129; Mechanics' Magazine, vol. 44, p. 109.]

A.D. 1845, June 5.—N° 10,708.

CLIFF, Joseph.—“ Certain improvements in the manufacture “ of alum, and aluminous compounds, from a substance not

" hitherto used for that purpose, and in the production of an " improved fire-clay from the residuum thereof." These are, first, " the extraction wholly or partially from fire-clays" of the " alumina " contained therein, previous to the application thereof to the " making fire-bricks, and other like fire resisting articles."

Second, " the manufacture of alum and aluminous compounds " from the Wortley fire-clay," or " any other fire-clay containing " alumina in similar abundance."

The clay is ground, calcined, and afterwards submitted " to the " action of sulphuric, nitric, muriatic, or other acid more or less " diluted;" the solution after lixiviation is freed " from iron by means " of prussiate of potash, gallic acid, sulphuretted hydrogen," &c., and either evaporate the solution down by itself, or mix " sulphate " or muriate of potash, soda, or ammonia with the solution, and " evaporate and crystallize the alum salts."

Third, " the application of the residuum of such fire-clays, either " by itself or in combination with Wortley or any other fire-clay " in its native state, to the making of fire-bricks, glass house pots, " crucibles, gas retorts," &c.

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 29; Mechanics' Magazine, vol. 44, p. 107; Engineers' and Architects' Journal, vol. 9, p. 92.]

A.D. 1845, June 23.—N° 10,726.

DU BUISSON, Michel Antoine Bertin Burin.—" New " and improved methods for the distillation of bituminous " schistus, and other bituminous substances, as well as for the " purification, rectification, and preparation necessary for the " employment of the productions obtained by such distillation " for various useful purposes." These are, in reference to this subject, first, the alkaline or caustic liquids separated from the oil after treatment with such solutions, are collected and kept for some time with a small layer of oil on the top, intercepting the action of the air. They separate into two liquids; the lower is " liquid and very limped," and is caustic soda solution " which " may serve for other operations," as treating raw oil and tar.

Second. " The ammonia contained in the water coming from " the distillation of schistus " is converted into sulphate of ammonia, by adding to it a small quantity of sulphuric acid, avoiding the addition of an excess; if, however, an excess has been added, a little alkali from the preceding operations must be added to saturate the excess of acid," when it is "concentrated " by evaporating about seven-tenths of the water," by " means " of a portion of the heat of the vapors of the distillation of the " schistus," and " for this purpose all the same vapors on leaving " the main pass into a large iron vessel, perfectly closed, and " which is above and in communication with the refrigerators. This vessel is very shallow in proportion to its surface," and receives a second vessel placed above, and in which the ammoniacal waters are evaporated.

[Printed, 1*s.* Drawings.]

A.D. 1845, June 26.—N° 10,739.

CROLL, Alexander Angus.—" Improvements in manufac" turing, measuring, and transmitting gas, and in obtaining " ammoniacal and other products from the refuse matters of such " manufacture." These are, in reference to this subject, "treating " ammoniacal liquor of gas works to obtain products therefrom." A still is charged with two hundred gallons of ammoniacal liquor, and it is connected with a curved pipe forty feet in length, surrounded with a casing, in which there is a continuous flow of water; the water being admitted at the end of the condenser flows towards the still. The refrigerating or condensing pipes near to the still are connected with a " dry lime purifier," containing hydrate of lime, " with as small a portion of moisture as " possible, not more than sufficient to slacken or powder the " lime. The purified gaseous caustic ammonia thus obtained is " to be condensed in distilled water to obtain the liquor ammonia " of commerce." " Carbonate of ammonia may be obtained by " causing such caustic ammoniacal gas to be brought in contact " with carbonic acid gas by any of the well-known processes." " A purifyer sufficiently large to be charged with forty bushels of " lime," is " a convenient size for working in connection with a " still and refrigerator of the dimensions given." " The purity " of the ammoniacal gas may be ascertained by an acetate of lead " test, similar to that used at gasworks;" when the lead paper " becomes discolored by the flow of the ammoniacal gas, the " lime contained in the purifyer must be exchanged for fresh."

[Printed, 2*s.* 4*d.* Drawings.]

A.D. 1845, July 8.—N° 10,757.

GREENWOOD, John, MERCER, John, and BARNES, John. —" Improvements in the manufacture of certain chemical agents " used in dyeing and printing cottons, woollen, and other " fabrics." These improvements consist, first, " in the manu- " facture of stannate and stannite of soda and potash in a dry " state, or in crystals, or in a state of paste," by " fluxing nitrate " of soda or potash with tin ;" and also "the making tin, pre- " paring liquor for dyers and printers, by dissolving in water " stannate or stannite of soda or potash which has been [so] " manufactured." The stannate is prepared thus :—" We take " twenty-two pounds of caustic soda (one gallon weighing thir- " teen and a half pounds), and put it in an iron crucible, heated " to a low red heat by a fire under it." When watery vapours cease to be evolved " we then add eight pounds of nitrate of soda, " and four pounds of common salt. When the mixture is at or " near the fluxing heat we add ten pounds of feathered block tin ; " we stir the materials together with an iron stirrer ;" " the stirring " is continued as well as the heat under the crucible, until igni- " tion or deflagration takes place, and it becomes red or white " hot, and of a pasty consistency ; the product is stannate of " soda." " If it is desired to have it in a more pure state, we " merely dissolve the dry stannate of soda in water, and allow " any impurity it may contain to settle." " We take the clear " liquor and evaporate down to crystallization, or to a pasty " state, not quite dry, but so dry as not to let any fluid run " from it." The stannite of soda is prepared thus :—" We take " four pounds of common salt, one gallon of caustic soda, " weighing thirteen and a half pounds, one pound of nitrate of " soda, and four pounds of feathered block tin ; we put all these " at once into a hot iron crucible over a fire, and stir and boil to " dryness, still stirring the dry powder so long as any ammonia " is given off. We then consider the process finished."

The " preparing liquor " for dyers and printers is prepared by dissolving about three pounds of the stannate of soda in one gallon of water, and then diluting it further, when required to be used, by more water according to the discretion of the printer. If stannate or stannite of potash be desired, then the equivalent of potash will be employed instead of soda.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 7 (*enlarged series*), p. 281 ; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 109 ; Mechanics' Magazine, vol. 44, p. 109 ; Practical Mechanics' Journal, vol. 1, p. 178.]

A.D. 1845, July 12.—N° 10,769.

SIMPSON, Richard.—(*A communication.*)—" Improvements in " bleaching yarns and fabrics." These are, the " employment " of certain solvents, by which the yarns or fabrics of linen are " to be prepared for bleaching [by boiling therein] before the " ordinary means or processes of bleaching are resorted to." The solvents may be " simple acids, followed by solutions of soda ash, " or acids combined with soda ash." "A composition of sol- " vents " " is made by twenty-two pounds of sulphuric acid of " the first quality and strength, diluted in fifty gallons of pure " water, which are to be boiled together in a leaden vessel, and, " whilst boiling, one hundredweight of the best soda ash is to be " introduced into the liquor by small quantities at a time." The effervescence having ceased, the boiling is continued "till the " soda ash is quite dissolved." When well settled the clear liquor will be ready for use, or the liquor may be evaporated, and " its essential properties crystallized in the state of salt." " The " above solvent may be rendered caustic " " by adding half a " hundredweight of lime, and an equal quantity of potash." The yarns may be steeped in a cold solution of the above solvent, or boiled in the solution previous to the ordinary process of bleaching.

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 163.]

A.D. 1845, August 4.—N° 10,797.

LONGMAID, William.—" Improvements in the manufacture " of chlorine, in treating sulphurous ores and other minerals, and " in obtaining various products therefrom." These are, first, " iron pyrites, or other sulphurous ores " are calcined together in preference in the proportions given in No. 9496, " in an open " furnace until sulphurous acid ceases to be evolved, or nearly so." The charge is then withdrawn, and calcined in a close furnace, and forcing in dry hot air by means of a fan or blower. The chlorine evolved passes into a flue moistened with water, which acts as a purifier. If the air is moist, hydrochloric acid is produced in place of chlorine. No. 10,004 is also referred to.

Second, " making chlorine by oxidising metallic chlorides, " such as manganese, copper, iron, zinc, and lead by access of

" atmospheric air deprived of moisture, thereby producing " chlorine, and the oxides of such metals."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 8 (*enlarged series*), p. 235; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 172.]

A.D. 1845, August 7.—N° 10,805.

BANKART, Frederick.—" Certain improvements in treating " certain metallic ores, and refining the products therefrom." These are, " the mixing of the different ores of copper and iron " pyrites in due proportion, according to the quantity of sulphur " relatively with the copper which they respectively contain, and " adjusting them in such manner as that those ores which hold " sulphur in excess may compensate others which are only or " partially deficient in sulphur, and in subjecting such mixture " to a succession of roastings and lixiviations (the residuum after " each roasting having the proportion of copper to sulphur adjusted as before), and thereby obtaining a solution of sulphate " of copper, whence the copper is obtained by precipitation in a " refined state." In carrying out the above it is stated that " the " sulphurous acid vapours proceeding from the various roasting " processes " may, " if desired, be condensed either as sulphurous " acid or employed for the manufacture of sulphuric acid, according to various well-known methods."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 7 (*enlarged series*), p. 271; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 93; Engineers and Architects' Journal, vol. 9, p. 120.]

A.D. 1845, August 9.—N° 10,812.

HILLS, Frank.—" Improvements in purifying gas for illumi" nation, and obtaining a valuable product in the process." These are, in reference to this subject, first, passing the gas through a solution of sulphate or muriate of magnesia in a similar vessel to " a wet lime purifier, having a stirrer or agitator;" magnesia and carbonate of magnesia are precipitated, and muriate or sulphate of ammonia are in solution.

Second. Employing " sulphate of lime in lieu of the salts of " magnesia," " sulphate of ammonia in solution is formed, and a " precipitate of carbonate of lime."

Third. " Employing the bisulphates or supersulphates and " sesquisulphates of soda and potash in solution as the purifying

" materials." " In the passage of the gas through this solution " the ammonia, carbonate of ammonia, and hydrosulphuret of " ammonia, which are combined with the gas, unite with one " equivalent of the acid of the bisulphates forming sulphate of " ammonia."

Fourth. " Combining with a free acid or with the acid of the " salts," sulphates of lime, magnesia, iron, and manganese, and muriates of lime, baryta, iron, or manganese, or acetate of lime, " in a vessel outside the purifier, the ammonia" absorbed by water used in washing the gas in the purifyer, and "returning the " solution to the purifyer again," " either in a continuous or inter- " mitting process to absorb more ammonia, &c."

" Combining an acid with the ammonia absorbed from the gas " by the water" by admitting a stream of acid, sulphuric acid preferred, into the purifier, " so as to fix the ammonia as fast as it " is absorbed, and prevent its being carried off by the passing " gas," " thus obtaining a strong solution of salt of ammonia."

" The arrangement for collecting and passing away the gases " set free when the combination of the acid with the ammonia" " is effected in the purifier without allowing them to mix with " the illuminating gas, by introducing the acid below a cone or " inverted dish placed in the lower part of the purifier, and " having a pipe at its top part for carrying away the gases."

" Driving or distilling off by heat the gases and ammoniacal " products absorbed by the water," and returning the water in a continuous process to the purifiers again after giving up its ammoniacal products, &c., preferring to use an evaporator, which is a coil of pipe heated by the waste heat of the retorts, or otherwise, to the lower part of which the lower part of the purifier is connected by a pipe; the lowest part of the coil " should be eight or " ten feet lower than the purifier." To the upper part of the coil is attached an ascending pipe, " which, to maintain the tempera- " ture, may be placed in the flue," the pipe being enlarged at the upper end so as to form a still head " to deliver off the ammonia " and its compounds, and the sulphuretted hydrogen and car- " bonic acid which have been absorbed by the water; this ascend- " ing pipe is connected at the upper end with the purifier by a " zig-zag pipe or horizontal worm," in preference surrounded with cold water. The still head is connected with a receiver. " Instead of returning the water from the evaporator to the "purifier it may be allowed to run off hot from the top part of the evaporator after it has delivered off its ammoniacal products."

"Placing two or more discs in the purifier for the better distributing the gas," and also using "coke, clinker, or such like substances," placed between the spreading discs.

"Refrigerating or keeping cool the purifying solutions by placing the purifier in cold water."

Fifth. Purifying gas "by passing steam into the gas main for the purpose of absorbing the ammoniacal products of the gas;" "the steam will unite with a good deal of ammonia of the gas, and be condensed in the refrigerator, from which it can be run off."

Sixth. "Passing the vapour of muriatic acid gas into the gas in its passage to the lime purifier;" other volatile acids may "likewise be employed. This is effected in a condenser divided by a shelf pierced with holes. The muriate of ammonia will be condensed, and "falling to the bottom may be drawn off." "To furnish the muriatic acid vapour a small cast-iron cylinder connected with the condenser may be used, into which common salt and sulphuric acid are put," and heated by a regulated fire. Or the muriatic acid is condensed, and the gas is passed through a pan of the acid, which is heated by steam through a coiled pipe. The peculiar construction of condenser is claimed.

Seventh. The application of rotatory exhausting machines "to the purpose of exhausting the gas from the retorts and forcing it through a considerable depth of liquid in the purifying vessel without subjecting the retort to increased pressure."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1845, October 23.—N° 10,893.

SMITH, Arthur.—"Certain improvements in the manufacture of soda ash." These are, substituting "vat waste in place of fresh calcareous matter, either in whole or only in part, in mixing the materials for the reverberatory operations of the soda manufacturer."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 8 (*enlarged series*), p. 34; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 342; Patent Journal, vol. 1, p. 19.]

A.D. 1845, November 3.—N° 10,911.

BINKS, Christopher.—" Certain improvements in manufacturing certain compounds of nitrogen, particularly cyanogen, " ammonia, and their compounds, and the use or application in " these manufactures of a substance or substances not hitherto " so employed." These are, first, " a current of the vapour of tar " oil mixed with atmospheric air " or some oxide of nitrogen is passed " through a pipe or cylinder of iron or fire-clay " filled loosely, for instance, " with pieces of fire-brick," and heated by a fire to a high temperature. By the action of an air pump a current is kept up through the apparatus; the cyanogen, &c. and its compounds are produced along with " abundance of lamp " black " which is deposited in a chamber, while the gaseous cyanogen, &c. compounds are drawn onward " through a cylinder " containing melted alkali or alkalized carbon strongly heated. " Different modifications of this apparatus are described, in some " of which the oil is used in the fluid state.

Second, substituting " carburetted hydrogen or olefiant gas " for the oil in obtaining the above matters.

Third, when coal is distilled the products are passed into another retort or cylinder containing a mixture of charcoal and alkali strongly heated; the above products are obtained along with impurities; several methods of producing these products from coal are given.

Fourth, " the production of cyanogen by the direct " " action " of nitrogen gas and carbon under the influence of a high temperature " and collecting the " cyanogen and hydrocyanic acid " produced by the action of heated air, steam, and carbon in " aqeous, alkaline, or metallic solutions."

Fifth, the use of finely divided iron produced from an oxide reduced by hydrogen gas, &c., for "purifying from sulphur the " liquors of prussiate makers," also converting cyanides into ferrocyanides. Also the direct action of steam upon the cyanide; and also the vat, which has a pipe in the centre for conveying steam, over which is a dome or cover " to deflect the upper " current."

Sixth, before using guano in making "prussiate of potash or " soda " it is washed first in cold water. Among the substances dissolved are " oxolate and other salts of ammonia," then with dilute muriatic or other acid, and the residue is dried and used for the above purposes; or boiling water is employed upon the guano, and the solution evaporated to dryness, and used in prussiate making, or in obtaining ammonia or its compounds. The guano is treated in several other ways, and the products resulting are likewise so treated to produce "oxalic acid, " oxalatis, &c."

[Printed, 1*s.* 2*d.* Drawings. Repertory of Arts, vol. 8 (*enlarged series*), p. 336.]

A.D. 1845, November 3.—N° 10,916.

BELL, Thomas.—" Improvements in certain processes in the " manufacture of alkali." These are, first, " condensing muriatic " acid evolved in that part of the manufacture of alkali which " consists of converting common salt into sulphate of soda" by combining with the ordinary condensing column " an exhaustion " or draft," " by a jet of steam acting through a cone or tube;" or " steam might be employed to obtain vacuum by condensing it " in vessels," or applying " a fan or other mechanical means for " obtaining a draft through such apparatus."

Second, " condensing the acid fumes or vapours in the manu- " facture of sulphuric acid by applying condensers partially " exhausted by steam, or by a fan, or other mechanical " means."

[Printed, 8*d.* Drawing. Repertory of Arts, vol. 8 (*enlarged series*), p. 14 London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 402; Patent Journal, vol. 1, p. 22.]

A.D. 1845, November 18.—N° 10,955.

LAMING, James.—(*A communication.*) — " Improvements in " making the cyanides and ferrocyanides of potassium and " sodium." " Charcoal, or other form of carbon in podwer," is " mixed with one of the alkalies," and the mixture is kept constantly fused, while a current of ammonia gas is introduced into it, " until great part of the alkali, or other compound of its base, " has become converted into cyanide." When carbonate of the alkali is used less charcoal can be mixed with it than when the alkali is caustic. It is better to have a number of vessels so heated connected together, so " that the nitrogen of the ammonia " which escapes the chemical reaction in the first vessel shall not " pass through the whole series without combining." The first product is a cyanide which may be dissolved out by boiling alcohol. The ferrocyanide is obtained " in the usual way."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 8 (*enlarged series*), p. 177: London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 181; Patent Journal, vol. 1, p. 327.]

A.D. 1845, November 27.—N° 10,970.

SPENCE, Peter. — " Improvements in the manufacture of " copperas and alum." These are, first, manufacturing copperas by digesting roasted iron pyrites in dilute sulphuric acid until " a neutral solution " of " a proper strength " to crystallize is obtained.

Second, " manufacturing solutions of sulphate of alumina by " causing shales or matters to be digested repeatedly with diluted " sulphuric acid." The acid, which is of a certain strength, is digested with the burnt shale " for from twenty to twenty-four " hours."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 8 (*enlarged series*), p. 28; Patent Journal, vol. 1, p. 43.]

A.D. 1845, November 27.—N° 10,972.

JONES, Eden Thomas. — " Improvements in the apparatus " used in the concentration of sulphuric acid." These are, " protecting vessels of glass or glass retorts " used for the above purpose " from the injurious effects of cold air " by " covers or " protectors " " of sheet iron or tin, or any other suitable " material, not liable to be injured by the heat of the process."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 8 (*enlarged series*), p. 35; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 420; Patent Journal, vol. 1, p. 99.]

A.D. 1845, December 4.—N° 10,976.

GOSSAGE, William.—" Improvements in obtaining products " from certain ores and other compounds of certain metals." These are, in reference to this subject, " obtaining certain products " which are volatilized or driven off from some of the sulphureous " ores and compounds," whilst " these are undergoing processes " or operations for the extraction of metallic products therefrom," by using apparatus described in N° 7267, in which is " a condensing apparatus for condensing and absorbing by water, and " thereby separating muriatic acid gas from smoke. This condensing apparatus being constructed in the form of a hollow

" tower or shaft, the interior of which is nearly filled with siliceous " pebbles or other suitable materials which will afford extensive " surfaces, these surfaces being moistened by water flowing from " the upper to the lower part of such condensing apparatus," so as to " remove from their surfaces the solid matters which become " arrested thereon during the percolation of the mixture of gases " and volatilized products through such apparatus, and these " solid matters thereby become mixed with water." This mixture is conveyed " into reservoirs, where the solid matters become deposited, and having run off the water (which may be again passed " through such apparatus)," the solid matters are collected and applied to useful purposes. These products vary with the constitution of the ores, &c. from the sulphurous ores, &c. of lead; " the volatilized products consist of sulphureous gas, also lead " combined with oxygen and sulphuric acid, forming oxide of " lead and sulphate of lead," together with smoke from the fuel. " As the oxide of lead and sulphate of lead are more valuable than " the sulphureous acid gas so obtained," it is preferred " to conduct these operations so as to arrest the oxide and sulphate of " lead; and when sulphureous ores, or compounds of copper, " iron, or zinc are calcined preparatory to the extraction of metals " therefrom, the volatilized products consist of sulphureous acid " gas and some metallic compounds, but as the quantity of the " latter is small," the operations are conducted " so as to render " valuable the sulphureous acid gas so produced" by calcining the ores " in kilns or in brick ovens, heated by heat transmitted " through the floors and coverings of such ovens," and decomposing " the sulphureous acid gas produced by such calcination, " by the means described for decomposing sulphureous acid gas" in N° 9974, thereby obtaining " sulphur in the state of vapour as " one of the volatilized products" from the ores.

[Printed, 6*d*. No Drawings.]

A.D. 1845, December 20.—N° 11,006.

JOHNSON, John Robert.—" Improvements in purifying gas, " and in the treatment of products of gas works." These are, first, " the use of substances in the dry or solid form and in a " divided state," as sulphate of iron, &c., for the purpose of separating " ammonia and its compounds."

Second, in treating "ammoniacal liquor of gas works," for " preparing the salts of ammonia," by distilling it slowly into " a solution of some substance which has the property of absorb- " ing the sulphuretted hydrogen," as "the salts of iron or " manganese," and "alkalies or lime mixed with water." Sulphuret of ammonium comes over first; if the solution of a salt of iron is used sulphuret of iron is formed and the ammonia combines with the acid of the salt. When lime or alkali is used ammonia is liberated and conducted into a second vessel "charged " with an acid."

[Printed, *6d.* Drawing. Repertory of Arts, vol. 8 (*enlarged series*), p. 87; London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 207; Mechanics' Magazine, vol. 45, p. 353; Patent Journal, vol. 1, p. 76; Engineers' and Architects' Journal, vol. 9, p. 283.]

A.D. 1845, December 24.—N° 11,019.

TURNER, WILTON GEORGE.—"An improved mode of treating " guano for the purpose of obtaining chemical compounds there- " from." This consists in boiling the uric acid obtained from guano with "peroxide of lead or peroxide of manganese," the former preferred, "in water or lime water, and thus producing " oxalate of lead, allantoine, and urea," by which oxalic acid is obtained from guano "without losing the nitrogen compounds." The guano in preference is treated as follows,—well-washed with cold water, next "digested in strong but cold solution of car- " bonate of soda or potash," and the residue consisting "of " urate of ammonia and bone earth" "may be at once treated " with dilute sulphuric acid" and afterwards with peroxide of lead; but, in preference, the residue is boiled in a dilute solution of carbonate of soda and the urate of soda separated in the hot solution on cooling "forms a confused crystalline mass," which is decomposed by boiling with sulphuric or muriatic acid and " pure peroxide of lead." The oxalate of lead is again decomposed by boiling with dilute muriatic acid. The solution from the oxalate of lead "contains allantoine and urea;" the former " is deposited in crystals as the liquor cools;" on evaporating the solution it "forms a thick syrup consisting of urea." The allantoine is decomposed by boiling with "a caustic alkali into " oxalic and ammonia." The urea "brought to the consistence " of a syrup may be used either for the manufacture of ammonia " or of compounds of cyanogen, or partly applied to both pur-

" poses." The "muriate of lead containing a little sulphate is converted into peroxide by adding to it milk of lime, and charging the mixture with chlorine gas, contained in Woulffe's vessel." The lime is in solution and the precipitate is washed.

[Printed, 6*d*. No Drawings. Repertory of Arts, vol. 8 (*enlarged series*), p. 39; Patent Journal, vol. 1 p. 96.]

A.D. 1846, January 20.—N° 11,052.

KURTZ, ANDREW.—"Certain improvements in the construction of furnaces, and apparatus connected therewith for evaporating or concentrating sulphuric acid."

[No Specification enrolled.]

A.D. 1846, February 25.—N° 11,111.

BRITTEN, JOHN.—"Certain improvements in the method of applying heat for the purposes of heating, cooking, and evaporating, and in the apparatus connected therewith." These are, in reference to this subject, "using the steam of one salt pan to heat a second or third pan;" "using a partial vacuum in the pan to be so heated;" also, "heating brine by causing it to circulate through a system of tubes or other shaped chambers, which are surrounded by steam, whether such tubes or chambers be employed to heat brine" in vessels under a partial vacuum, or "to heat brine which may be exposed to surface evaporation for the production of coarse salt." Likewise, "adapting an apparatus consisting of a number of small tubes or chambers, to such evaporating pans as are heated by a variable supply of steam," for the purpose of evaporating brine. The patentee does "not confine himself to any particular form or construction of such apparatus." The apparatus described consists of "an iron vessel about ten feet diameter and seventeen feet high, of sufficient strength to admit of its being rendered nearly vacuous without danger of collapsing." In the middle of this pan "is a vessel of copper or other suitable metal, consisting of a number of tubes placed perpendicularly and surrounded and inclosed by one large cylinder or a number of segments of smaller cylinders." This is called the heater, and steam from a boiling salt pan is admitted to it through a pipe and surrounds these tubes, and imparts its heat to the brine in contact, and "creates an

" ascending and descending current." This pan is exhausted to about fourteen inches; the steam is condensed or may be employed for heating other brine.

[Printed, 6*d*. No Drawings.]

A.D. 1846, March 11.—N° 11,123.

BARRUEL, Jean Joseph Ernest.—" Improvements in " working of certain sulphurets to transform them into metal or " oxides, and to collect the latter; also to collect the oxides from " oxidized ores equivalent to these sulphurets." These are, first, the " decomposition of the sulphuret of antimony for the purpose " of obtaining the oxide " by " mixing the sulphuret with carbon " and calcareous substances, or with carbon and peroxide of manganese, or with carbon and peroxide of iron," and " submitting " the mixture in a suitable vessel or apparatus to the requisite " degree of heat."

Second, " for the purpose of collecting the oxide of antimony, " the employment of a vessel having at one end an aperture for " the escape of the oxide, and at the other end an apperture for " the admission of air to burn the metal in the interior of the " vessel, which latter aperture is to be kept closed until the metal " is set free."

Third, causing " air which is to combine with the metal " for the above purpose, " to pass through screens or sieves in a continuous current by means of a blast flue, or any suitable ventilating apparatus, to divest it of extraneous matter before " entering the distilling vessel, which is charged with the metal or " with materials from which the metal may be obtained."

[Printed, 4*d*. No Drawings. Patent Journal, vol. 1, p. 275.]

A.D. 1846, April 9.—N° 11,163.

HUNT, Joseph.—" Improvements in the manufacture of " soda."

[No Specification enrolled.]

A.D. 1846, May 2.—N° 11,190.

MERCER, John.—" Certain improvements in scouring and " clearing wool and woollen fabrics, and in bleaching and clearing

" silk, cotton, and linen and other fabrics." These are, using and employing " the phosphates and arseniates of potass, of soda, " and of ammonia, added to and along with the substances usually " used and employed in scouring and cleansing these fabrics, " which are carbonates of potash, carbonate of soda, ammonia, " soap, and urine." Any of these salts will do, but " subphos- " phate of soda or subarseniate of soda " are preferred. The subphosphate of soda and subarseniate of soda are made by " mixing " equal weights of phosphate of soda and soda ash, or arseniate " of soda and soda ash, and after dissolving them in hot water " evaporate the clear solution to a crystallized state or powder."

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 336; and Patent Journal, vol. 1, p. 421.]

A.D. 1846, May 12.—N° 11,204.

BULLOCK, John Lloyd.—(*A communication.*)—" Improve- " ments in the manufacture of quinine." These are, first, preparing " purified quinoidine or chinoidine " as follows :—A certain quantity " of the residue of quinine manufacture, termed chinoi- " dine," is dissolved in dilute sulphuric acid and sulphuretted hydrogen passed through the solution for nine hours, " after which " it is filtered and boiled, and a solution of carbonate of soda " added; the precipitate is washed, dried, and powdered." " This " purified chinoidine may also be kept in solution in alcohol or " other vehicle, or made into saline compounds," by combining it with acids. Preparing " amorphous quinine :"—Chinoidine is mixed with sand and digested with two doses of ether. The fluids are distilled " by means of a water bath," and the residue dried and used as above. Preparing " basic extract of bark :"—" The residue " left upon treating chinoidine with ether, in order to extract the " amorphous quinine, contains also valuable medicinal matter." This " is treated with a large quantity of alcohol, preferred of " 56° over proof," and the alcohol evaporated the residue is dried. Or, " the dry residue as above " is treated with dilute sulphuric acid, and the solution treated exactly " as when producing purified " chinoidine, and in making solutions and saline compounds " therefrom."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 9 (*enlarged series*), p. 41; Patent Journal, vol. 1, p. 419.]

A.D. 1846, June 4.—Nº 11,238.

LOWE, George.—This is an extension for the term of five years from June 9, 1846, of a patent granted June 9, 1832, No. 6276, for " An invention for increasing the illuminating power of such " coal gas as is usually produced in gas works ; also for convert- " ing the refuse products from the manufacture of coal gas into " an article of commerce not heretofore produced therefrom ; and " also for a new mode of conducting the process of condensation " in the manufacture of gas for illumination."

The invention is described at page 107.

A.D. 1846, June 29.—Nº 11,263.

DE SUSSEX, Francois Stanilas Meldon. — " Improve- " ments in the manufacture of soda and potash." These are, first, "decomposing muriate of soda or potash" by distilling them with "hydrated nitric acid," at a temperature of about 212° F. The acid is added in certain proportions. When the whole of the muriate has not been decomposed, and a portion of nitric acid has been distilled into the receiver, the distillate is returned into the retort and re-distilled as before; it may be necessary to add to the retort more nitric acid.

Second, " Decomposing alkaline salts by means of earths for " the purpose of manufacturing soda and potash." The alkaline salts may be " nitrate or muriate," the former is preferred. Caustic or carbonate of lime, baryta, or strontia is mixed with the nitrate and the whole distilled at a red heat ; the nitric acid is condensed, soda or potash is dissolved out of the residue in the retort. If silica or alumina are present with the materials, a silicate or aluminate of the alkali is formed ; thisis decomposed by carbonic acid gas, and carbonate of the alkali is in solution with precipitation of silica or alumina.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 9 (*enlarged series*), p. 117 ; Patent Journal, vol. 2, p. 607, and vol. 10, p. 283.]

A.D. 1846, July 6.—Nº 11,279.

WARD, Peter.—" Improvements in the manufacture of certain " salts of soda and magnesia." These are, first, " the application " of magnesia or its carbonates in the manufacture of carbonate " of soda." The salt of magnesia " in a state of fine powder " is added in certain proportions to "the alkaline liquors when they " are being boiled down to the state of ash in the salting-down " furnace, or with the ash after it has been drawn from that fur- " nace and previously to its being introduced into the carbonating " furnace." The ash thus mixed is heated in the carbonating furnace for some hours until the solution of the same is free from colour. The magnesia is washed with water.

Second, "the manufacture of Epsom salts" by dissolving the above magnesia in sulphuric acid.

Third, "the use of sulphurets of magnesium and calcium to " separate the iron in solution with the sulphate of magnesia." The lime salt is obtained from vat waste; the magnesian salt is made by carbonizing sulphate of magnesia and coke in powder for some hours.

Fourth, "the use of native carbonates of magnesia," without " first calcining and washing, when manufacturing Epsom " salts."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 9 (*enlarged series*), p. 111; Mechanics' Magazine, vol. 46, p. 254; Patent Journal, vol. 2, p. 558.]

A.D. 1846, July 14.—N° 11,290.

PATTINSON, William Watson.—"Improvements in the " manufacture of chlorine." These are, "the use of steam within " a still or vessel containing muriatic acid and oxide of manga- " nese for the production of chlorine, after the same shall have " been heated up to a high temperature (about 180° F.) by the " application of heat externally, either by steam" or otherwise. The still is charged with muriatic acid and oxide of manganese in lumps, and heated as above for about eighteen hours, when steam is introduced "directly among the residual materials" at a pressure of "about ten pounds per inch, or higher, by which the " temperature of the materials is after some time raised to " from 212° to 220° and nearly the whole of the chlorine is " expelled."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 10 (*enlarged series*), p. 10; London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 157; Patent Journal, vol. 2, p. 577.]

A.D. 1846, July 23.—N° 11,307.

BELL, Thomas.—"Improvements in the smelting of copper " ores." These are, first, calcining or roasting copper ores so as to manufacture "sulphuric acid by employing anthracite coal, "coke, or charcoal in combination with a jet or jets of steam," preferring "to use a roasting furnace such as has before been "applied for calcining or roasting copper ores, consisting of three "or four floors." To this furnace is "attached a roasting kiln, "such as is used in alkali works for making sulphuric acid from "pyrites." The gas from the first furnace passes into the kiln kept full of ore. Between the furnace and the kiln is a long flue in which deposits any solid particles "mechanically carried off "from the ore in the furnace." At the end of a flue from the roasting kiln are "a jet or jets of steam to produce the requisite "amount of draught for the furnace and kiln" and near the vitriol chamber for the purpose also of supplying aqueous vapour for the condensation of the sulphurous acid. Second, "the use "of columns of coke or other suitable material with means of obtaining a draught through the same when combined with "apparatus for making sulphuric acid in the process of smelting "copper ores by using anthracite coal, coke, or charcoal."

Reference is made to his former Specification, Nº 10,916.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 9 (*enlarged series*), p. 168; London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 109. Patent Journal, vol. 2, p. 605; Engineers' and Architects' Journal, vol. 10, p. 88.]

A.D. 1846, August 11.—Nº 11,326.

HILLS, Frank.—"A method or methods of treating certain "gases, and manufacturing sulphuric acid, muriatic acid, acetic "acid, and certain salts of potash, soda, and ammonia." These are, first, purifying "illuminating gas by passing it through the "sulphate and muriate of the peroxide of iron, either in solution "or in a solid form," also "the use of muriate of magnesia;" by placing it in gas retorts its acid is driven off, and combining "with the ammonia of the gas" forms "muriate of ammonia "which will condense with the gas liquor."

Second, manufacturing "sulphuric acid from sulphuretted "hydrogen by burning it" in "such a manner that atmospheric "air may come repeatedly in contact with it at successive points "of its passage through the furnace to the condensing chamber." A furnace is described with a series of shelves over which the gas passes and air is admitted at one end of each. Also "concentrating "sulphuric acid in glass vessels by drawing off part of the charge

" of the vessels (when sufficiently concentrated) while hot, either " in a continuous stream (by means of a platinum syphon through " a cooling pipe of platinum placed in water) or occasionally, and " filling them up again with weaker acid, which had better be as " hot as possible."

Third, " condensing the vapour of muriatic acid in flat curved " chambers " in which are a series of pipes full of water situated between the furnace and the chimney, and named " a pipe " condenser."

Fourth, " the substitution of muriatic acid for sulphuric acid in " the manufacture of acetic acid by the decomposition of the " acetates."

Fifth, " manufacturing nitrate of potash by the mutual decom- " position of nitrate of soda and muriate of potash." Solutions of these salts in equivalent proportions are evaporated together; muriate of soda, the most insoluble of the two salts, crystallizes out first.

Sixth, " producing silicate and carbonate of potash and soda" by fusing white sand with sulphate of soda in certain proportions, and when the sulphate is decomposed, " enough potash or soda " must be added in the furnace to make a soluble silicate of the " alkali employed." The solution of silicate is converted into carbonate by carbonic acid gas, also the use of native chromate of iron for polishing glass.

Seventh, " obtaining the cyanides of potassium and sodium from " the charcoal or coke of peat, peat moss, bog earth, or turf" by treating it "in the same manner as the charcoal obtained from " animal matter is usually treated to obtain the cyanides."

Eighth, " the distillation of ammonia and its volatile compounds " from ammoniacal solutions in stills," either " by the agency of " heat obtained from heated air or gases coming in contact with " the ammoniacal liquor in its passage through the still, or by the " agency of heat derived from steam, hot water, or heated air or " gases passing through pipes or hollow vessels, but not coming " in contact with the ammoniacal liquor." Also, a condensor acting on the "principle in which the ammoniacal vapour from " any form of still comes in contact with pipes or small hollow " vessels, through which is conveyed or is passing the ammoniacal " liquor to be distilled, whereby the ammoniacal vapour is con- " densed and cooled and its heat conveyed to the ammoniacal " liquor to be distilled."

Likewise, "obtaining carbonic acid from a lime kiln for the "purpose of combining with ammonia to make its carbonates."

Ninth, "obtaining ammonia or carbonate of ammonia from "peat, peat moss, bog earth, or turf, burnt in a furnace with the "admission of air or air and steam, and also obtaining muriate "of ammonia" by bringing the ammonia "in contact with the "muriate acid; under this head obtaining ammonia from peat by "its destructive distillation is not claimed."

Tenth, "manufacturing sesqui-carbonate of ammonia from the "bicarbonate of ammonia found in guano by sublimation in the "usual way, or by any other convenient means. Before sub-"liming, it should be mixed with a considerable quantity of "charcoal or coke dust, or any other substance capable of de-"priving it of its offensive smell."

[Printed, 10*d*. Drawings. Patent Journal, vol. 2, p. 660.]

A.D. 1846, October 15.—Nº 11,417.

DONKIN, John.—"Improvements in the manufacture of paper, "or in the machinery employed therein, and in the process of "bleaching paper, linen, and other manufactures in which chloride "of lime is employed." These are as follows:—When bleaching with chloride of lime, "it is desirable to get rid of it (the chloride of "lime) as soon as possible after it has produced the desired bleaching "effect;" for this purpose the liquid so pressed out of the material, and the last traces of chlorine, are decomposed by the addition of a chemical agent. The chemical agent employed for that purpose, it is stated, "is usually called by chemists bisulphite of soda," "although sulphite of soda will decompose chloride of lime," but will not produce so beneficial an effect. "The bisulphite of "soda is not" a "usual article of commerce," but "it may be "made by any of the processes known to chemists as applicable "for that purpose." The patentee manufactures it either "by "exposing thin layers of dried soda of commerce to sulphurous "acid gas, either produced from burning sulphur or otherwise, so "that the soda may combine with the sulphurous acid to such "an extent as to form the bisulphite of soda." Or, dissolving "the soda of commerce in water," and then passing "sulphurous "acid gas through or into the solution until the soda becomes a "bisulphite, and the solution may in this case be more or less "saturated as may be desired; and if the solution be made

" moderately warm, and sufficiently saturated, the liquid will, " upon cooling, deposit crystals of bisulphite of soda ;" but the patentee says he does not confine himself " to the use of the " bisulphite of soda made by these methods or either of them."

By a Disclaimer entered and filed with the Clerk of the Patents, March 23 1847, the title of this invention was altered to, " Improvements in the manufacture of paper, and in the process of " bleaching linen, and other manufactures, in which chloride of " lime is employed."

[Printed, 4*d*. No Drawings.]

A.D. 1846, October 22.—N° 11,425.

JULLION, James Thomas.—" Improvements in the manufac- " ture of certain acids; also improvements in decomposing " certain acids, and applying the products resulting therefrom to " the production of certain chemical compounds."

These are, first, " the conversion of any of the compounds of nitro- " gen into hyponitrous, nitrous, and nitric acids in closed vessels, " and by the addition of oxygen gas or atmospheric air;" as an example, the oxides of nitrogen evolved in the manufacture of oxalic acid are passed from the decomposing vessel with an excess of air or oxygen into a vessel containing platinum in the state of sponge or " asbestos coated or covered with platinum " or " other catalytic or contact substances " heated " to from six " hundred to nine hundred degrees F.," and from this vessel the acids pass into a series of condensers, from the last of which there is a pipe to convey off " uncondensed vapours."

Second, manufacturing " sulphuric acid by decomposing water " by means of sulphurous acid and chlorine."

Sulphurous acid and chlorine, either in solution or in the gaseous form, or brought together if in the gaseous state with water, into what is termed the conversion vessel heated by a sand bath, or other means sulphuric and hydrochloric acid are formed, and the former is obtained by distilling from it the latter, or the chlorine and sulphurous acid together with steam in place of air or oxygen may be passed through such a conversion vessel as is described in the first process, only no platinum is required. The conversion vessel is connected with a condensing arrangement of some sort.

Third, decomposing " hydrochloric acid by means of oxygen " gas in conjunction with platinum or any other catalytic sub-

" stance at an elevated temperature," thus obtaining chlorine; dry hydrochloric acid gas and oxygen are mixed together in certain proportions and passed into the apparatus. The chlorine obtained is passed through water.

Fourth, formic acid saturated with a solution of potash has added to it half as much more potash, and the whole evaporated and heated to not exceeding 560° F.; when the swelling and the liberation of gas ceases the operation is complete, and the formiate is converted into oxalate. Other salts of potash and of soda, and also the alkaline earths, may be used in place of the potash.

Fifth, decomposing the oxalates produced as above by adding a solution of any of the soluble salts of baryta in excess to a solution of the oxalate, washing the precipitate, and decomposing it y means of sulphuric acid or bisulphate of potash in order to obtain oxalic acid or binoxalate of potash,

[Printed, 8*d*. Drawing. London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 29; Patent Journal, vol. 2, p. 821.]

A.D. 1846, December 1.—N° 11,467.

ELLINS, George.—" Certain improvements in apparatus for " manufacturing salt." These are, applying " metal pipes within " the salt pan or vessel " so " as to cause salt to crystallize and " separate itself " from the brine; " such metal pipes being dis" posed in rows within the pan, so as to be immersed in and " surrounded by the brine, and being kept supplied with steam " or with hot water passing in a continued current through the " interior of such pipes," for the purpose of evaporating the brine; the disposition of the pipes within the pan " being such " as will leave suitable spaces between the rows of pipes for rolling " or gathering the salt towards the side or sides of the pan, and " then taking it up out of the pan."

Reference is made to a former Specification, No. 10,542.

[Printed, 1*s*. 4*d*. Drawing.]

A.D. 1846, December 3.—No. 11,474.

READE, Joseph Bancroft.—" Certain improvements in inks " and in the processes by which the same are manufactured, and " the application of some of these processes to the production of " certain salts." These are, first, making " a blue writing ink " free from acid " by dissolving in iodide of iron half as much of iodine as it already contains, and pouring this solution "into "a semi-saturated solution of yellow prussiate of potash" containing about the weight of salt as there was of iodine used. The precipitate, "which is a soluble Prussian blue," is "washed," and finally dissolved in water "forms the blue writing ink."

Second, producing iodide of potassium. The solution from the last process is "neutral iodide of potassium, with iodide of "iron in excess;" the excess of iodide of iron is got rid of "by "the well-known processes of fusion and crystallization," "the "result is an iodide of potassium" pure.

Third, manufacturing "a blue ink especially suited for printing," by substituting bromine in place of iodine in the first process, and rubbing "up the precipitate in oil."

Fourth, producing bromide of potassium from the residue, as in the second process.

Fifth, the manufacture of a "black writing ink" by adding to "gall ink of a good quality from a tenth to a twelfth part of the "soluble Prussian blue."

Sixth, manufacturing a red ink "by boiling cochineal repeatedly "with water, afterwards" with water containing liquor ammoniac. The liquids are thrown together, and the colouring matter precipitated by "ammonio bichloride of tin. The precipitate is "afterwards dissolved in ammonia and protiodide of tin added "till a sufficient degree of brilliancy of color is obtained."

Seventh, manufacturing marking ink by rubbing together nitrate of silver and tartaric acid in a dry state, then adding water; tartrate of silver is formed and nitric acid is set free, adding ammonia, finally adding "gum, colouring matter, and water."

Eighth, manufacturing marking ink not acted upon "by the "common solvents of salts of silver" by taking "the ink last "formed" and adding to it "an ammoniacal solution of an oxide "or salt of gold," as the purple of Cassius, "hyposulphite of "gold, ammonio iodide, and periodide of gold."

Ninth, the production of these two last salts by dissolving iodine in ammonia with heat, adding to this solution gold leaf, which immediately dissolves, but diluted with water the action is less rapid. This salt "crystallizes in four-sided prisms which are "soluble in water."

Tenth, the manufacture of blue printing ink, by taking the soluble precipitate under the first head and "rubbing up the same

" in oil," or by boiling the ink down and " then rubbing up the " same in oil. Also of black printing ink, by boiling down the " black writing ink produced " under the fifth head, " and rubbing " it up in oil;" and again, boiling chips of logwood or other woods and tannin, adding a proto or per salt of iron or copper, adding bichromate of potash; " finally, rubbing up the whole in oil," adding a small quantity of lampblack, &c. Likewise, making red printing ink by taking the ammoniacal solution of cochineal described under the sixth head, rubbing " it up in oil, adding " protiodide of tin," or " boiling down the red writing ink " as described, and " then rubbing up the same in oil."

[Printed, 4*d*. No Drawings. Mechanics' Magazine, vol. 46, p. 549.]

A.D. 1846, December 14.—N° 11,484.

LONGMAID, William.—" Improvements in the manufacture " of alkali and chlorine."

[No Specification enrolled.]

A.D. 1846, December 31.—N° 11,515.

CHÉNOT, Adrien.—" Certain improvements in the treatment " of metallic oxides and their compounds, and in apparatus for " the same." The object of these improvements is, where it is possible, to obtain metals from their ores in spongy masses, and in order to do so the ores are reduced to oxides by roasting in furnaces; in this state it is stated the ores " may be employed " as " desulphuretting, dephosphoretting, and dechloridizing agents, " as well as to decompose the alkaline or metallic sulphurets, " phosphates, and chlorides." The reduced ore or metallic sponge may be treated with acids to " obtain various salts of iron, and " employed as a substitute for the old iron usually made use of " to obtain sulphates, acetates, phosphates, and chlorides, and " other salts of iron, and also in the manufacture of hydrogen " gas." " The reduced ore may be mixed in various proportions " with silica in order to form silicates without the application of " heat," and with lime, alumina, &c.

[Printed, 1*s*. Drawings. Repertory of Arts, vol. 10 (*enlarged series*), p. 215; Patent Journal, vol. 3, p. 153.]

A.D. 1847, January 7.—No. 11,521.

LOTHMAN, Charles Reinhold.—“ Improvements in the “ manufacture of white lead.” These are, the “ use of lead in “ any state whatsoever capable of being converted into white “ lead,” that “ is to say, lead in any state in contact with atmo-“ spheric air, carbonic, acetic, acetious, and aldehydic acids, and “ steam.” As an example, an air-tight chamber is used capable of being heated “ from 72° to 96° F., or more or less.” Throughout this chamber sheets of metallic lead are suspended, and on the floor of the chamber is placed a tub containing malt, sugar, yeast, and water. After the fermentation has ceased, the liquid is drawn off and mixed with vinegar, and heated by steam, is “ re-“ gularly and gradually introduced through a pipe or tube in the “ chamber.” “ After the mixture is taken out, a fresh supply “ has to be inserted.” “ The lead is thus converted into white “ lead.”

The acids and vapours from breweries are introduced as above into the chamber.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 10 (*enlarged series*), p. 305; London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 92; Patent Journal, vol. 3, p. 220.]

A.D. 1847, February 1.—N° 11,555.

TILGHMAN, Richard Albert.—“ Improvements in the ma-“ nufacture of certain alkali salts.” These are, first, “ the manu-“ facture of sulphate of potash by heating together, at or above “ redness, a potash felspar, lime, and the sulphate of either lime, “ baryta, or strontia.” The materials ground to a fine powder and mixed are introduced into a reverberatory furnace and heated as above with exposure to air for eight or ten hours; the result is lixiviated and the sulphate of potash evaporated.

Second, “ the manufacture of muriate of potash by heat-“ ing together a potash felspar, and the muriate of either soda, “ lime, or iron at a temperature above the fusing point of the “ muriate employed.” The mixture well dried is heated in an iron cylinder with an opening only at one end closed by a door luted tight, in which is a small hole with a loose plug for escape of gases. After six hours the mass is quickly immersed in water and the chloride dissolved out and crystallized.

Third, " the manufacture of chromate of potash by heating to " redness (for from 18 to 20 hours) a mixture of potash felspar, " lime, or its carbonate and chrome ore all in fine powder, in an " oxidizing atmosphere."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 10 (*enlarged series*), p. 160; Patent Journal, vol. 3. p. 243.]

A.D. 1847, February 1.—N° 11,556.

TILGHMAN, RICHARD ALBERT.—" Improvements in the manufacture of certain acids, alkali, and alkaline salts." These are, first, the decomposing the sulphates of baryta, strontia, lime, and magnesia, " and the muriates of the same bases," by exposing them at a high temperature to the action of a current of steam for the purpose of obtaining the acids and the alkalis of these salts respectively. The steam passes up through the charge, carrying " off the acid in the state of sulphurous acid and oxygen with " sometimes a little sulphuric acid mixed with it " " into a leaden " chamber in order to combine them into sulphuric acid by the " usual means."

Second, " decomposing the sulphates and muriates of potash " and soda for the purpose of obtaining the acids and the alkalies " of these salts respectively, by exposing them at a high tem" perature to the joint action of a current of steam and of alumina, " or other combining substance." The alumina is prepared by igniting the sulphate or " any other well-known process." After the completion of the process the mass is lixiviated with water and the solution of aluminate of potash or soda may be saturated with carbonic acid, by which the alumina is precipitated and carbonate of the alkali obtained.

Third, making sulphate of soda by the combined action of sulphate of lime and a current of steam at a red heat.

Fourth, making chromates of potash and soda by exposing a mixture of chrome ore and sulphates or muriates of these alkalies respectively at a bright red heat to a current of steam and an oxidizing atmosphere.

Fifth, making aluminate of potash and soda by the action of a current of steam upon a mixture of alumina and the sulphate or muriate of potash or soda at a high red heat.

[Printed, 6*d*. No Drawings. Repertory of Arts, vol. 10 (*enlarged series*), p. 155; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 122; Patent Journal, vol. 3, p. 263.]

A.D. 1847, February 19.—N° 11,585.

DE SUSSEX, François Stanilas Meldon. — " Improve-" ments in the manufacture of chlorine, hydrochloric acid, nitric " acid, and obtaining several products therefrom." These are, first, " in manufacturing certain chlorides of magnesium, aluminum, " strontium, barium, chiefly used for manufacturing hydro-" chloric acid and chlorine " and " the obtaining of oxide of lead " and oxide of manganese as products therefrom." These chlorides may " be made by combining any quantity of those earths " respectively with as much of the ordinary liquid hydrochloric " acid as they would neutralize," but in preference the earths are spread on shelves in a chamber and gaseous hydrochloric acid is evolved into the chamber, the quantity of acid gas depending on the salt required. Another mode of obtaining these chlorides is to add the bases of the salt required in certain proportions to a solution of the chloride of manganese; the result is chloride of magnesium or aluminium in solution and oxide of manganese precipitated. Carbonate of magnesia may be employed instead of magnesia. These chlorides may also be obtained by heating magnesia or alumina with chloride of manganese in a dry state in a furnace. These chlorides may likewise be made by mixing chloride of lead and the base of the salt required in certain proportions, adding sufficient water to dissolve up the chloride of the base which was added when formed,and passing " into it chlorine or " any oxidising agent." " Chloride of lead will be decomposed and " a solution of chloride of magnesium (&c.) and an insoluble oxide " of lead will be formed. Carbonate of magnesia may be employed " in place of magnesia." The chloride of magnesium may also be obtained by adding chloride of magnesium to the mixture of chloride of lead, with magnesia instead of chlorine as beforementioned, but the proportions of the materials to be used would be different.

Second, manufacturing hydrochloric acid from the chlorides made as above, or from other chlorides decomposed by heat and obtaining the bases. The chloride of magnesium is preferred. The salt is distilled at a red heat until acid ceases to be evolved, and the gas condensed in water the base of the salt remains.

Third, manufacturing chlorine as follows, and " obtaining as " products therefrom, oxide of manganese, sulphuric acid, and the " bases of the chlorides used." In a stone, earthenware, or lead still having a funnel by which to add substances chloride of magnesium and peroxide of manganese mixed together in certain proportions are placed and water added. The materials are agitated from time to time while heat is applied and sulphuric acid gradually added sufficient "to combine with the manganese and with the "magnesia" of the chloride, and the chlorine evolved is conducted into "the chamber or vessel in which it is to be received." After the chlorine is all evolved the residue, "the mixed sulphates "of magnesia and manganese, are placed in another vessel" dissolved in an excess of water and caustic or carbonate of magnesia added in certain proportion, and agitating and heating until the sulphate of manganese is decomposed, the sulphate of magnesia is separated from the oxide of manganese which is washed, and "con- "verted into peroxide of manganese" by a process "described in "N° 10,296, or dried and exposed to the air," it will be converted into a hydrated deutoxide of manganese. "The solution of sul- "phate of magnesia is evaporated and separated into its elements "by dry distillation at a full red heat, and preferring to have a jet "of steam playing upon the heated sulphate of magnesia." Chloride of aluminium may be substituted for chloride of magnesium and alumina for magnesia or its carbonate in the above process, but it is preferred to heat the mixed sulphates and the alumina in the dry state so as to decompose the sulphate of manganese and wash out the sulphate of alumina from the oxide of manganese. Another mode of manufacturing chlorine is substituting "for the "peroxide of manganese the manganate or hy-per manganate of "soda or potassa," described in N° 10,296; the quantities of the substances employed differ, but the process is the same and the results are the same with the exception that the magnesia contains sulphate of soda or potash from which it may be freed by washing. The baryta salt may be used in place of the potash or soda salt.

Another mode of making chlorine, "without the aid of sulphuric "acid, or in the dry way," is to heat to redness together or separately but "simultaneously" "chloride of magnesium or any such "other chloride as aforesaid and any oxidizing agent, such as per- "oxide of manganese or hy-per manganate of soda, potassa, or "baryta" thoroughly dry; the chlorine evolved is "disposed of "in such a manner as may be required." The proportions of the materials used are given.

Fourth, manufacturing nitrates of soda and potassa from which nitric acid is to be obtained; nitrate of lead in solution and in certain proportion is added to a similar solution of chloride of sodium or potassium; chloride of lead precipitates, and nitrate of soda or potash is in solution with a little of the lead salt from which a small portion of lime, magnesia, or their carbonates precipitates the lead. The solution evaporated yields nitrate of potash or soda from which nitric acid is obtained in the usual way, or in preference in the manner described in N° 11,263.

[Printed, 6*d*. No Drawings. Repertory of Arts, vol. 10 (*enlarged series*), p. 288; Patent Journal, vol. 3, pp. 389 and 405.]

A.D. 1847, February 20.—N° 11,586.

ROBERTSON, JOSEPH CLINTON.—(*A communication.*)—"Certain improvements in distillation and brewing, and certain "applications of the materials used in or suitable therefor to "other manufacturing purposes." These are, in reference to this subject, the application of a "modification of the method or "process" described for promoting "the formation of alcohol "from saccharine juice," "whereby it is rendered applicable to "the manufacture of vinegar, and which modification consists in "allowing the temperature to rise to about 70°." The method is, "atmospheric air is impelled by a forcing pump into the liquor "in the vat" through a pipe which "terminates in a number of "smaller radial pipes" "which are perforated with numerous "small holes." The wort and yeast are introduced into the vat at 45° or 50° F., and the temperature should never exceed 50°.

[Printed, 6*d*. Drawing. Patent Journal, vol. 3, p. 307.]

A.D. 1847, March 16.—N° 11,624.

DUNLOP, CHARLES TENNANT.—"Improvements in the manufacture of alkali and chlorine, and in the application of the products resulting therefrom." These are, first, the manufacture of chlorine by bringing "together common salt, nitrate of soda, "or nitric acid and sulphuric acid in suitable proportions," and on applying heat "chlorine, an oxide of azote, and muriatic acid "are evolved," and are passed through a condenser "charged "with sulphuric acid" strong enough "to absorb the oxyde of "azote. The chlorine and muriatic acid are then separated by "means of water." The residue is suitable for manufacturing soda, &c. Second, "the sulphuric acid charged with oxyde of "azote" is diluted and distilled, and the oxyde of azote made to traverse a condenser with the aid of air and steam or water "is by this means all transformed into nitric acid;" or, instead of this, the "oxyde of azote" is evolved into "a suitable "chamber into which a current of sulphuretted hydrogen is "streaming at the same time; by this means sulphate of ammonia is obtained and sulphur deposited."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 10 (*enlarged series*), p. 308; London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 200; Patent Journal, vol. 3, p. 436.]

A.D. 1847, March 23.—Nº 11,635.

DE SUSSEX, Francois Stanilas Meldon.—"Improvements in the smelting of copper and other ores." These are, in reference to this subject, "the several methods of obtaining "oxides of copper, or of the other metals freed from sulphur," and the oxides of copper, "from the sulphates or chlorides of the "said metals respectively," as follows:—Having ascertained by analysis, or otherwise, the composition of the sulphuret to be smelted, and should the silica be less than fifty to sixty per cent., "adding to it so much sand as will be found necessary to form a "compound of copper and silica, containing from fifty to sixty "per cent. of the latter." If the silica be found "to exceed "fifty or sixty per cent., and the other components be considered "in too small a proportion," previously to subjecting the pulverized ore to desulphuration, adding "to it such proportions of "lime, flour spar, or other earths as may be considered necessary." The powdered ore is mixed intimately with "finely "sifted charcoal, anthracite, coals, or other combustible matter "free from sulphur," in certain proportions, and calcined for three or four hours in a reverberatory furnace below a red heat, when the temperature is lowered, and "four or five per cent. of "either alumina, or magnesia, or magnesian limestone, and at "the most, one per cent. of nitrate of soda, of potash, or of "lime," are added, "stirring with closed damper, and raising the "temperature a little higher than before the sulphur and its compounds are oxidized, and thus form sulphate of magnesia, or "alumina, which sulphates have the property of yielding their acid "at a high temperature." Other oxidizing agents may be used in place of nitre. In place of finishing as above, after the ore, &c., is roasted for three or four hours in a reverberatory furnace, it is drawn into a tank, close to the reverberatory furnace, containing solutions of either ammonia, soda, potash, magnesia, or other earths forming soluble salts with acids of sulphur, but caustic ammonia is preferred, and diluted with a certain amount of water; the ore is stirred and allowed to subside; and the liquor, now a solution of sulphate of ammonia, is drawn into a lower tank where caustic lime is added to it in certain proportions, by which the ammonia will become caustic and may be used again. In place of using nitre as before, a solution of nitrate of soda, potash, or lime, may be used so as to moisten the whole of the ore before calcining it. Sulphates of copper or other metals to be treated, are dissolved with heat in a pan, and an equivalent proportion of an earth added, magnesia preferred, sulphate of magnesia is in solution, and "the oxide "of copper being insoluble subsides;" the liquid is drawn off and evaporated, the residue is dry sulphate of magnesia, which being heated to a red heat, with a jet of steam, as is described in No. 11,585, "will be decomposed into an oxide of magnesium, "and sulphuric acid will be evolved and condensed." Instead of using an earth (magnesia) as above, soda, potash, or ammonia could be employed "in decomposing metallic sulphates." The chlorides of copper, or other soluble chlorides, are decomposed after solution in water by the alkaline earths, magnesia, lime, &c., the solution is chloride of the earth, from which chlorine or hydrochloric acid may be obtained as described in No. 11,585. The remainder of the processes are for obtaining metallic silver from the chloride, and copper from the ores treated as above.

[Printed, 6*d*. No Drawings. Repertory of Arts, vol. 10 (*enlarged series*), p. 46; Patent Journal, vol. 3, p. 507.]

A.D. 1847, May 22.—N° 11,710.

FOURMENTIN, Jean Marie.—"Improvements in the manu-"facture of carbonate of lead." These are, first, "the decom-"position of the oxichloride of lead by means of carbonic acid "either in the gaseous state or dissolved in water." The oxichloride of lead is obtained "by the action of chloride of sodium "or sea salt upom protoxide of lead." Carbonic acid, in preference from the combustion of coke, &c., or from calcining carbonate of lime with coke, &c., is forced into and through a series of cylinders with radial beaters, in which is the oxichloride of lead with water.

Second, "the treatment of the materials at the boiling point, "which greatly facilitates the chemical action." "When the "action of the carbonic acid on the oxichloride is complete, &c." (which is ascertained "by boiling the solution," and if "carbonic "acid is evolved" and "a white precipitate formed," "the decom-"position is complete);" the mass is boiled with "a quantity of "finely-powdered carbonate of lime, equivalent to the quantity of "salt decomposed by the oxide of lead in the first instance," from half an hour to four or five hours, until a portion of the filtered fluid on adding "ammonia and the hydrosulphate of "ammonia," gives "no precipitate." If the carbonate of lime is not sufficiently free from iron carbonate of soda is employed, "and the two operations is united in one."

[Printed, 10*d.* Drawing. London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 269.]

A.D. 1847, June 29.—Nº 11,773.

PRELIER, Paul Gilbert.—(*A communication.*)—"Improve-"ments in the manufacture of dry sulphuric acid and in the "manufacture of smoking or Nordhausen sulphuric acid." These are, taking "simple sulphates" and combining "them with a "fresh proportion of acid for the purpose of making double sul-"phates, which are to be decomposed by the action of heat." The retorts are of freestone heated in galleries, when the acid dropping in water makes a noise as does "a red hot iron" when "thrust" in water. This "is dry acid," and the receivers are fixed.

[Printed, 4*d.* No Drawings. Repertory of Arts, vol. 11 (*enlarged series*), p. 107; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 27; Patent Journal, vol. 4, p. 153.]

A.D. 1847, September 30.—Nº 11,881.

JAY, Charles.—"Certain improvements in apparatus for eva-"porating and concentrating saccharine and saline solutions, "and which may also be applicable to the evaporation and con-"centration of vegetable and other extracts." These are said to be, first, "the construction and employment of a jet or jets," such as those afterwards described, "for producing a blast for exhaust-

" ing or drawing off hot air or vapours from any vessel or place " where such exhaustion is required." Instead of employing a single jet of steam of large dimensions as hitherto, sub-dividing the blast into a number of small jets, or causing it to issue from an annular opening.

Second. "The adaptation and employment of tubes" constructed as is afterwards " described or any modification thereof, " for causing a current of hot air to percolate through saccharine, " saline, and other solutions for the purpose of concentrating the " same;" also, the mode " or any modification thereof, for heat- " ing such air by means of the waste steam, hot air, and vapour " issuing from the steam blast or from any other convenient " source." The solution in the evaporating vessel is heated by steam from the boiler or generator, from the top of which it issues and passes through a pipe into a tubular chamber, which is divided longitudinally by a horizontal partition into two parts, the upper compartment only being in communication with a large steam pipe, and from this upper chamber a series of small steam heating pipes extend horizontally across the lower part of the evaporating vessel and terminate in a chamber or series of chambers at the opposite end; and a lower series of pipes are arranged in such a manner that there is one return pipe for every pair of heating pipes. It is sometimes advisable to make two longitudinal slits at the under sides of the air pipes, and to furnish these latter with jackets which partially envelop them.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1847, October 14.—N° 11,910.

WALL, Arthur.—" A new or improved apparatus for and " method of separating oxides from their compounds and each " other." This consists in "arranging a series of magnets into " an apparatus" for the above purposes. Two frames or straps carry an " endless strap of leather" or some such material, on the surface of which are " fixed a series of magnets," " and in con- " nection therewith are thin iron or steel plates" "which are split " into narrow strips and which are turned edgwise so as to leave " spaces between them." "In using this apparatus, supposing " iron is to be separated from copper ore," the ore is roasted, ground, placed on an inclined platform, and motion given to the drums or frames carrying the endless strap, by which the plates

" will enter amongst the ground matter and the oxides of iron " will be attracted by and separated from the other oxides or " other matters."

[Printed, 10*d*. Drawing. Repertory of Arts, vol. 12 (*enlarged series*), p.32; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 330. Patent Journal, vol. 4, p. 528; Engineers' and Architects' Journal, vol. 11, p. 144.]

A.D. 1847, November 2.—N° 11,931.

LONGMAID, William.—" Improvements in the manufacture " of alkali and chlorine." These are, first, decomposing " common salt with sulphate of iron," and obtaining " sulphate of " soda, oxide of iron, and chlorine." The sulphate of iron or other metallic sulphate perfectly dry is mixed in certain proportions with chloride of sodium, and proceeded with as in N° 10,797, or a hot saturated solution of common salt is added to the metallic sulphate, the mixture evaporated to dryness and calcined in a close furnace.

Second, decomposing chloride of potassium with metallic sulphates or iron pyrites or other sulphurous ores in a reverberatory furnace, as described in N° 9496.

Third, " to work the sulphate ash into alkali at one operation " without first lixiviating it to separate the sulphate of soda from " oxide of iron and other matters." Small coal is mixed in certain proportions with the sulphate ash, and the whole is heated " in " the usual mode of manufacturing black ash." When the ball is cooled the alkaline matter is dissolved out and the solution treated with carbonic acid and evaporated for " crude carbonate " of soda or alkali."

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol 33 (*conjoined series*), p. 21; Repertory of Arts, vol. 11 (*enlarged series*), p. 360.]

A.D. 1847, November 4.—N° 11,944.

LAMING, Richard.—" Certain improvements in manufactur- " ing and purifying coal gas, and in treating a residual product " of such manufacture; also improvements in preparing materials " to be used in the purification of coal gas." These are, in reference to this subject, first, it is stated that " chloride of calcium " is both abundant and cheap; under certain circumstances it " may, however, be desirable to make it for the purposes ofgas " purifying, by decomposing muriate of manganese, iron, or zinc " by means of lime or chalk when the latter will suffice. In such

" cases the oxides or carbonates, which result are useful for the " said purification and need not be removed."

Second. Using "carbonates of manganese, iron, zinc, and " lead for the purification of coal gas." "To obtain these " carbonates in an economical manner," throwing down "from " ammoniacal or gas liquor obtained in making coal gas and " previously distilled or not the sulphur which it contains, and " having drawn off the clear liquor" precipitating "its carbonic " acid, or instead of making two separate precipitates" throwing down "a mixed sulphuret and carbonate of the precipitant or " precipitants."

Third. "Treating the ammoniacal liquor of gasworks so as to " obtain from it and sulphate of lead, a solution of sulphate of " ammonia, and either an oxide or carbonate of lead of sufficient " purity to serve as or to be made into white lead." The ammoniacal liquor is distilled with or without lime, and the products condensed in water. The first solution is caustic ammonia with hydrosulphuric acid, and the latter is carbonate and hydrosulphate of ammonia. In either case the next step is to add carbonate of lead with stirring to remove the whole of the hydro-sulphuric acid, and "next stir in enough white sulphate of lead to furnish to the " ammonia its equivalent of sulphuric acid." In the case of caustic ammonia "the lead is a precipitate of white hydrated " oxide, and in the case of the carbonated ammonia a white " carbonate of leads falls down, the solution in either case con" taining sulphate of ammonia."

Fourth. Increasing the purifying powers of the aforesaid chloride of calcium, &c., &c., by "adding thereto oxide of mananese, iron, " zinc, or lead obtained in a proper state from any other econo" mical source." The oxide preferred is prepared from the carbonate by exposing it "to a heat gradually increased to near " redness, with access of air for an hour or two, or untill the " carbonic acid be expelled and oxygen absorbed in its place."

Fifth. "Processes for making carbonate of manganese;" first, by adding "an equivalent quantity of gas liquor, previously dis" tilled or not, but in either case carefully deprived by any known " means of its hydrosulphuric acid" to a solution of muriate or sulphate of manganese, and then having withdrawn the supernatant liquid, "thoroughly wash the precipitated carbonate with " water." Second, adding carbonate of soda to a solution of waste residue of the chlorine makers, decanting the solution of sulphate of soda which is a valuable product from the carbonate

" will enter amongst the ground matter and the oxides of iron " will be attracted by and separated from the other oxides or " other matters."

[Printed, 10*d*. Drawing. Repertory of Arts, vol. 12 (*enlarged series*), p.32; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 330. Patent Journal, vol. 4, p. 528; Engineers' and Architects' Journal, vol. 11, p. 144.]

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Third, "to work the sulphate ash into alkali at one operation " without first lixiviating it to separate the sulphate of soda from " oxide of iron and other matters." Small coal is mixed in certain proportions with the sulphate ash, and the whole is heated "in " the usual mode of manufacturing black ash." When the ball is cooled the alkaline matter is dissolved out and the solution treated with carbonic acid and evaporated for " crude carbonate " of soda or alkali."

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol 33 (*conjoined series*), p. 21; Repertory of Arts, vol. 11 (*enlarged series*), p. 360.]

A.D. 1847, November 4.—N° 11,944.

LAMING, RICHARD.—" Certain improvements in manufactur" ing and purifying coal gas, and in treating a residual product " of such manufacture; also improvements in preparing materials " to be used in the purification of coal gas." These are, in reference to this subject, first, it is stated that " chloride of calcium " is both abundant and cheap; under certain circumstances it " may, however, be desirable to make it for the purposes ofgas " purifying, by decomposing muriate of manganese, iron, or zinc " by means of lime or chalk when the latter will suffice. In such

" cases the oxides or carbonates, which result are useful for the " said purification and need not be removed."

Second. Using "carbonates of manganese, iron, zinc, and " lead for the purification of coal gas." "To obtain these " carbonates in an economical manner," throwing down "from " ammoniacal or gas liquor obtained in making coal gas and " previously distilled or not the sulphur which it contains, and " having drawn off the clear liquor" precipitating "its carbonic " acid, or instead of making two separate precipitates" throwing down " a mixed sulphuret and carbonate of the precipitant or " precipitants."

Third. "Treating the ammoniacal liquor of gasworks so as to " obtain from it and sulphate of lead, a solution of sulphate of " ammonia, and either an oxide or carbonate of lead of sufficient " purity to serve as or to be made into white lead." The ammoniacal liquor is distilled with or without lime, and the products condensed in water. The first solution is caustic ammonia with hydrosulphuric acid, and the latter is carbonate and hydrosulphate of ammonia. In either case the next step is to add carbonate of lead with stirring to remove the whole of the hydro-sulphuric acid, and "next stir in enough white sulphate of lead to furnish to the " ammonia its equivalent of sulphuric acid." In the case of caustic ammonia "the lead is a precipitate of white hydrated " oxide, and in the case of the carbonated ammonia a white " carbonate of leads falls down, the solution in either case con- " taining sulphate of ammonia."

Fourth. Increasing the purifying powers of the aforesaid chloride of calcium, &c., &c., by " adding thereto oxide of mananese, iron, " zinc, or lead obtained in a proper state from any other econo- " mical source." The oxide preferred is prepared from the carbonate by exposing it "to a heat gradually increased to near " redness, with access of air for an hour or two, or untill the " carbonic acid be expelled and oxygen absorbed in its place."

Fifth. "Processes for making carbonate of manganese;" first, by adding "an equivalent quantity of gas liquor, previously dis- " tilled or not, but in either case carefully deprived by any known " means of its hydrosulphuric acid" to a solution of muriate or sulphate of manganese, and then having withdrawn the supernatant liquid, "thoroughly wash the precipitated carbonate with " water." Second, adding carbonate of soda to a solution of waste residue of the chlorine makers, decanting the solution of sulphate of soda which is a valuable product from the carbonate and washing "with water as before." Third, boiling "carbonate of magnesia with an equivalent of sulphate or muriate of manganese," decanting off the solution of sulphate or muriate of magnesia and washing "the precipitated carbonate of manganese;" sometimes using magnesian limestone in powder, and obtaining "carbonate of manganese mixed with carbonate of lime, which does not prevent its efficaceous application to the purification of coal gas," "either as a carbonate or converted into an oxide."

Sixth. "Applying preparations of lead and zinc to the purification of coal gas, and in recovering them for repeated use." About two equivalents of oxide of lead and one equivalent of sulphate of lead in coarse powder are mixed together and wetted with water, to which a small quantity of acetic or nitric acid may be added, and the gas passed through this mixture until it ceases to purify the gas. When it is removed, "dried and exposed in a furnace or on an iron plate for an hour or two to a low red heat, which restores them again to the state of sulphate and oxide of lead, with the volatilization of hydrosulphate of ammonia which may be allowed to escape;" or the mixture is first heated "in a retort and the volatile matters conducted into water or some acid or apparatus capable of condensing it;" or washing out the sulphate of ammonia, sometimes using for this purpose "the gas liquors, either distilled or not, which have been already converted into a solution of sulphate of ammonia by sulphate of lead." Repairing "the waste of sulphate and oxide of lead in the daily operation by adding to the used mixture, before heating it, a part of the precipitated sulphuret and carbonate of lead which results from the action of sulphate of lead on the gas liquors." By a disclaimer and memorandum of alteration entered and filed June 5, 1852, those parts described under the first head, also the use of carbonate of iron in purifying coal gas and increasing the purifying powers of the chloride of calcium by the use of oxide of iron are retained, whilst the other parts are disclaimed.

[Printed, 2*s*. 2*d*. Drawings. Patent Journal, vol. 5, p. 8; Exchequer Reports, vol. 9, p. 256; Law Journal (*Exchequer*), vol. 23 (*new series*), p. 60; Journal of Gas Lighting, vol. 3, p. 323.]

A.D. 1847, November 16.—N° 11,966.

BIRKMYRE, WILLIAM.—"Improvements in smelting copper and other ores." These are, first, "roasting or calcining sepa-

" rately" the "ores of copper, silver, lead, tin, antimony," by " placing these ores in an open vessel in a mundic kiln, so that " the vapours from its contents shall escape freely with the " vapours of combustion of the iron pyrites, and be condensed at " the same time in the vitriol chamber."

Second, "the disengaging simultaneously from an open vessel " in a mundic kiln the deutoxide of nitrogen for the vitriol " chamber with that of oxidating the said ores by mixing with " the said ores saltpetre or cube nitre."

Third, "the supplying the vitriol chamber with steam, by using " a solution of saltpetre or cube nitre with the said ores."

Fourth, "the action of sulphuric acid" upon these ores "after " they have been treated with saltpetre or cube nitre, and either " before or after they have been freed from the sulphate and " arseniate of potash or soda." When the action has ceased after heating the ores with the nitre or cube nitre, "the sulphate " and arseniate of potash or soda are dissolved out of the calcined " ore and saved."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 11 (*enlarged series*), p. 353; Mechanics' Magazine, vol. 48, p. 500; Patent Journal, vol. 5, p. 27; Engineers' and Architects' Journal, vol. 11, p. 215.]

A.D. 1847, December 22.—Nº 12,001.

ROCHAZ, Charles André Felix.—" Certain improvements " in treating zinc ores and in manufacturing oxide of zinc." These are, first, "obtaining metallic zinc." The ore, oxide, carbonate, or silicate mixed with a suitable flux is charged into a furnace having a blast into it some little way from the bottom. "The zinc is volatilized by the heat, and the scoria fall " into the lower part of the furnace and are run out" of apertures at the bottom. "The reduced zinc is volatilized and the " vapours condensed and conducted into a receiver," situated " over the mouth of the furnace and heated by the gases there- " from."

Second, "producing oxide of zinc by distilling the metal or " matters containing the metal in subliming pots or vessels fur- " nished with perforated covers, through which the volatilized " metal may issue into an oxidizing chamber, where it is met or " brought into contact with the oxygen of the atmosphere, and " becomes converted into oxide of zinc."

[Printed, 1*s*. 2*d*. Drawings. London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 97; Mechanics' Magazine, vol. 49, p. 286; Patent Journal, vol. 5, 303; Engineers' and Architects' Journal, vol. 11, pp. 307 and 343.]

A.D. 1848, January 5.—N° 12,016.

ARROTT, ALEXANDER ROBERTSON.—"Improvements in "manufacturing common salt." These are, first, "the use of "such a proportion" of chloride of calcium or chloride of magnesium "in mixture with brine as will provide for the solution "being concentrated to a considerable extent in a closed boiler "or heating vessel without depositing salt therein."

Second, the concentration as above, and "transferring such "solutions to proper open vessels or pans" there to cool and deposit the common salt.

Third, the use of heated solutions of the chlorides of calcium and magnesium "for dissolving common salt from rock salt, "and obtaining common salt by cooling the solutions thereby "obtained."

[Printed, 10*d*. Drawings. London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 105; Mechanics' Magazine, vol. 51, p. 41; Artizan, vol. 6, p. 227; Patent Journal, vol. 5, p. 195.]

A.D. 1848, January 18.—N° 12,028.

CRANE, CHARLES, and JULLION, JAMES THOMAS.—"Improvements in the manufacture of certain acids and salts, and "a new apparatus applicable to the said improvements." These are, first, "any continuous mode of adding to the mother liquor, "in due proportions and by degrees, the materials to be decomposed; also the application of a high temperature;" and "likewise the manufacturing of nitric acid from the oxides of "nitrogen by decomposing water by means of chlorine." A large vessel called a generator is heated by means of steam or hot water; two feeding vessels each with a tap are placed above this vessel, one containing nitric acid and the other syrup; two funnel pipes pass through the top of the generator, which is made tight nearly to the bottom, "to convey proportionably and by degrees the "materials to be decomposed or acted on from the feeding vessels." "A quantity of the mother liquor" (nitric acid and syrup) is placed in the generator, the heat is rapidly raised to 180° or 200° F.; streams of nitric acid and syrup are regulated by cocks into the funnels; the nitrous gases evolved as oxalic acid is formed are led off by a pipe into a vessel with water, into which a stream of chlorine gas is passed at the same time sufficient to convert the whole of the oxides of nitrogen into nitric acid, by decomposing a portion of the water and forming nitric and hydrochloric acids, the vapours of which pass off into a series of condensing vessels.

Second, "oxidizing metallic substances, and the manufacture " of nitrates, by contact of the oxides of nitrogen with any metal " or metallic oxide or any alkali or alkaline earth in conjunction " with oxygen gas or atmospheric air." As an example lime is placed on "apparatus similar to the dry lime purifier," and "a " current of the mixed gasses passed slowly through them."

Third, "decomposing the tartrates of potash by means of any " sulphuret, or by sulphuretted hydrogen, in conjunction with " any basic substance capable of forming an insoluble tartrate."

Fourth, "manufacturing of ammoniacal and cyanogen com" pounds from the oxygen compounds of nitrogen by means of " hydrogen gas, or any compound or mixture of hydrogen with " carbon, in conjunction with any catalytic or contact substance," in preference platinum, "in the state of sponge, or asbestos coated " or covered with the platinum may be substituted," placed in a tube and heated in preference "to about 600° F.," to which is attached a series of condensers.

Fifth, the generator described under the first head and the condensers, consisting of a series of vessels the bodies of which have a number of tubes resting between the top and bottom, and from the bottom connecting arms, so as to connect them together.

[Printed, 8*d*. Drawing. Repertory of Arts, vol. 12 (*enlarged series*), p. 167; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 420; Mechanics' Magazine, vol. 49, p. 42; Patent Journal, vol. 5, p. 90.]

A.D. 1848, January 25.—Nº 12,038.

MITCHELL, James Barr, and WOOLRYCHE, Thomas Best.—"Improvements in the manufacture of soda, and in treating " products obtained in such manufacture."

[No Specification enrolled.]

A.D. 1848, January 27.—Nº 12,045.

PATTINSON, William Watson.—"Improvements in the " manufacture of soda." These are, "stirring the matters con" tained in decomposing, balling, carbonating, and drying fur" naces, used in the manufacture of soda by machinery set up in " such furnaces;" also cooling the "machinery so used by cir" culating water through the same." A vertical shaft of cast iron, on the top of which is a horizontal cog wheel, "driven by

" the prime mover, passes through the roof and bottom of the " furnace and rests in a foot step;" arrangements are made at the bottom to "prevent the materials in the furnace from coming " in contact with the shaft;" the furnaces are round and arms of cast iron "extend from the centre to near the circumference of " each bed;" attached to these arms are a series of "knives or " stirrers of iron or other suitable material, which project down into " the mass to be stirred, and reach nearly to the furnace bottom." " When the ball is to be withdrawn, a slide forming part of the " furnace bottom" being removed, "the motion of the arms re- " versed, and the charge gradually expelled from the opening." A stream of water flows through the shaft and arms.

[Printed, 1s. Drawing. Repertory of Arts, vol. 12 (*enlarged series*), p. 242; Artizan, vol. 7, p. 81; Patent Journal, vol. 6, p. 58.]

A.D. 1848, March 22.—Nº 12,099.

ELLINS, George.—"Certain improvements in manufacturing " salt, and in apparatus for manufacturing salt." These are, first, " the application of a current or currents of heated air" to act beneath the bottom or bottoms of a salt pan or pans or beneath a portion of the same, "such current or currents" being forced by the action of suitable blowing machinery so as "to pass in " small divided streams through heated pipes of iron inclosed in " a hot air stove or oven," and "with part of the bottom of the " salt pan forming a flat roof or top to the said stove or oven;" and the air so heated is conveyed by a passage or passages, beneath a portion or portions of the bottom of a salt pan having hot brine resting on the same, "and the other portion or por- " tions of the said bottom having steam applied beneath the " same." The hot air thus escapes "into the flue or flues of an " ordinary drying stove for drying salt;" or, previously to escaping, it "may pass onwards through the passage or passages " of another second salt pan, which may either have steam heat " like the first or may be a simple salt pan without steam heat;" or the current or currents of hot air, or a portion or portions of same, after having operated in manner aforesaid or partly so " operated, may then pass out of the passage or passages "so as " to be emitted in small streams beneath the surface of the same " brine," communicating additional heat thereto, "so that there " will in such case be a three-fold communication of heat to " the brine."

Second, apparatus for raking salt along the bottom of a salt pan by means of rakers so arranged as to rake the salt "in either "direction along the pan," and "also for drawing the salt up out "of the brine in the pan, and depositing and accumulating that "salt upon a moveable table," where the brine will drain from the salt, and when the table is tilted the salt descends into the place where it is to be stored.

Third, moulding the salt. The mould has six spaces, and is "only a frame with sides, ends, and five cross partitions without "any bottom or top;" this is placed on a loose board to serve as a bottom on the bottom of the salt pan. The mould is then filled by the machinery under the second head, the salt beaten down, and a top placed on and attached to the temporary bottom; the mould with the salt is then turned over, the top becoming the bottom, what is now the top is removed, and the beating and stamping is completed, the top put on, and the whole raised out of the pan is drained from brine.

Fourth, supplying regulated quantities of coal to furnaces by means of hoppers partly in the upper part of the furnace, the coals for a charge being held between two sliding plates in the hopper.

[Printed, 2*s*. 4*d*. Drawings. Artizan, vol. 7, p. 57; Patent Journal, vol. 6, p. 14.]

A.D. 1848, May 9.—N° 12,151.

LAMING, Richard.—"An improvement or improvements in "the manufacture of oxallic acid."

[No Specification enrolled.]

A.D. 1848, May 26.—N° 12,165.

SOLOMONS, Abraham, and AZULAY, Bondy.—"Improve"ments in the manufacture of gas, tar, charcoal, and certain "acids." These are, first, in manufacturing the above, destructively distilling wood by means of steam at a high temperature. Two cylinders of iron, one within the other; in the inner is the wood enveloped in a perforated sheet-iron casing; the pressure of the steam should be "one half to one atmosphere," the temperature required is 572° F., ascertained by "a pyrometer or other "suitable means;" the products are conveyed from the inner cylinder and condensed by means of refrigerators.

Second, manufacturing the above by destructively distilling by steam "peat turf, sawdust, spent bark, tan, spent dye woods, the

" residuum of beetroot sugar, potato starch, and other vegetable " substances." These substances are placed in small cases which are perforated, and suitably separated from each other in the inner cylinder, or they are distilled by the direct action of fire, or they may be made into blocks and distilled in an ordinary retort or a retort with a rotary motion.

No process is given for separating the various products.

[Printed, 10*d*. Drawing. Mechanics' Magazine, vol. 49, p. 547; Practical Mechanics' Journal, vol. 1, p. 227; Artizan, vol. 7, p. 84; Patent Journal, vol. 6, p. 76.]

A.D. 1848, June 6.—N° 12,176.

BARNES, Richard.—" Improved apparatus for manufacturing " gas for illumination, part of which improvements is applicable " to retorts for distilling pyroligneous acid and other similar pur" poses." The improvement relating to this subject is applying the method of closing the mouth of the retort by means of a water-joint " to retorts for distilling pyroligneous acid and other " similar purposes."

The outer rim of the cover of the retort rests in a deep groove which is filled with water.

[Printed, 1*s*. Drawings. Mechanics' Magazine, vol. 49, p. 573; Practical Mechanics' Journal, vol. 1, p. 229; Artizan, vol. 7, p. 107; Engineers' and Architects' Journal, vol. 12, p. 23.]

A.D. 1848, June 13.—N° 12,186.

HUNT, William.—" Improved apparatus to be used in pro" cesses connected with the manufacture of certain metals and " salts." These are in reverberatory furnaces. In the front of the furnace is a floor or hearth of brick, upon which is put a supply of small coal, which the heat from the fire on the grate bars immediately behind it partially decomposes, and when it " be" comes slightly coherent and porous," it is then pushed forward by means of rakes passing through two small doors in front; two appertures in front supply air to the coal on the bed. The bed is fed by a door at the side, and there is also an opening at the grate bars for the purpose of loosening clinkers.

[Printed, 10*d*. Drawing. Mechanics' Magazine, vol. 49, p. 599; Practical Mechanics' Journal, vol. 1, p. 252; Artizan, vol. 7, p. 106.]

A.D. 1848, August 21.—N° 12,246.

RICHARDSON, Thomas.—" Improvements in the condensation of metallic fumes, and in the manufacture of white lead."

These are, first, " the separation of tin and other impurities " from tea lead by means of oxidation through the use of hot " air." The tea lead in a melted state is exposed to a " slow " current of hot air in an ordinary red lead furnace, or in an iron " pan encased in brickwork similar to that already in use in " calcining hard lead." The oxide of tin, &c. floats on the top, and is raked off from time to time.

Second, " the use of carbonic, acetic, or nitric acids, alone or " mixed, free or combined with oxide of lead, steam, and hot air, " for the conversion of metallic lead into white lead." The lead in crystals or granulated, and the above acids, alone or mixed, and diluted with water, or a solution of acetate or nitrate of lead, are mixed together so as to be moist, and spread in a set of chambers contained in a framing of wood or stone; into each chamber " steam and carbonic acid gas are admitted by means of pipes." Heated air may be used in place of steam. The temperature should be maintained at about 90 or 100 F. " The carbonic acid may be " obtained from the burning of limestone, coke, or charcoal," &c.

Third, " the use of steam in conjunction with a shower of " water, and with or without a steam jet for condensing metallic " fumes."

[Printed, 8*d*. Drawing. Repertory of Arts, vol. 13 (*enlarged series*), p. 283; London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 193; Mechanics' Magazine, vol. 50, p. 189; Artizan, vol. 7, p. 183; Patent Journal, vol. 6, p. 216; Engineers' and Architects' Journal, vol. 12, p. 115.]

A.D. 1848, August 22.—N° 12,251.

CROLL, Alexander Angus.—" Improvements in the manu- " facture of gas and in apparatus to be used in transmitting gas." These are, in reference to this subject, " the use of sulphurous " acid in such manner as to deprive carburetted hydrogen gas of " the sulphuretted hydrogen gas with which it is contaminated, " and thus to obtain the sulphur of both compounds in the form " of flowers of sulphur." Making a solution of sulphurous acid by " causing a current of sulphurous acid gas from the burn- " ing of sulphur to pass through the water or liquid by which " it is largely absorbed;" " about six ounces of sulphur will re- " quire to be burned for every gallon of water." The sulphurous acid thus made is charged into a series of vessels like wet lime purifiers, and through each of these the gas is passed. "When the " sulphurous acid in the first vessel has been all decomposed, or " nearly so, the contents must be discharged into a suitable " reservoir, where the liquor may settle or be filtered, and the " sulphur obtained and dried." The gas is passed afterwards through washers in order to remove any sulphurous acid, finishing with passing it through a dry lime purifier.

Modifications of these arrangements are described. The remainder of this invention refers to making and distributing gas.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 13 (*enlarged series*), p. 233; London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 196; Mechanics' Magazine, vol. 50, p. 212; Artizan, vol. 7, p. 183, and vol. 9, pp. 73, 124, and 194; Patent Journal, vol. 6, p. 216; Engineers and Architects' Journal, vol. 12, p. 150.]

A.D. 1848, August 22.—N° 12,252.

PATTINSON, HUGH LEE.—" Improvements in manufacturing " a certain compound or certain compounds of lead, and the " aplication of this and certain other compounds of lead to " various useful purposes."

[No Specification enrolled.]

A.D. 1848, September 4.—N° 12,264.

LAMING, RICHARD.—" Improvements in the modes of obtain- " ing or manufacturing sulphur and sulphuric acid." These are, first, " the use of pumice stone and other cheap porous bodies in " conjunction with ammonia," and also the modes described ; " however they may be combined for endowing such bodies with " increased catalytic energy." The pumice stone is boiled in concentrated sulphuric acid, drained, immersed in water containing a little ammonia, dried and heated in a closed retort " with about one " per cent. of peroxide of manganese," gradually raising the " temperature to near 600° F.," allowing it to cool out of the atmosphere. Other modes of preparation may be substituted; for example, after draining from sulphuric acid it may be immersed in " nitric acid, or a solution of an alkaline nitrate, or it may be " boiled or simply immersed in a mixture of sulphuric and nitric " acids."

Second, the apparatus for applying the catalytic porous bodies above described for making sulphuric acid from " sulphurous acid

" gas mixed with a due proportion of atmospheric air, and a " minute quantity of ammonia gas." This consists of a series of rows of vertical columns filled with the catalytic body, and connected together, so that the gases pass from one to the other, and finally into a chimney, " the draft of which is sufficiently strong to " maintain a current throughout the whole conduit, of which each " column forms a part." The sulphuric acid, as it is formed in the columns, is washed from them by water introduced into each, into cisterns formed " below each pair of columns."

Third, the concentration of sulphuric acid by passing it in a slender stream, or the spreading it in a thin stratum, having progressive motion over surfaces of earthenware, so arranged that the acid comes into contact with surfaces more highly heated as it becomes itself more highly concentrated." The apparatus consists of a column made of stoneware, with a number of horizontal diaphragms with raised edges, which have a hole in their centre; between every two diaphragms is a table with raised edges. The weak acid is introduced by a funnel at the top, and it " falls from diaphragm to table, and from table to " diaphragm," until it reaches the bottom, where it is drawn off by a syphon. Air heated high enough to boil the weak acid is admitted at the bottom, and finally escapes out of the top along with the vapours evaporated. A modification of this apparatus " may be applied to the old process for making sulphuric acid by " aid of nitric acid."

Fourth, " in making or obtaining sulphur," " introducing the " mineral acid to the gas liquor in close wooden vessels, and " receiving the mixed sulphuretted hydrogen and carbonic acid " in a close wooden vessel containing a solution of sulphurous " acid," sulphur precipitates, and the carbonic acid evolved is passed through a column of sawdust, with water to wash out any sulphurous acid it may contain, thus preventing the loss of sulphurous acid.

[Printed, 10*d.* Drawing. London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 342; Mechanics' Magazine, vol. 50, p. 233; Artizan, vol. 7, p. 209; Patent Journal, vol. 6, p. 226.]

A.D. 1848, September 28.—N° 12,275.

HALLIDAY, ANDREW PATON.—" Certain improvements in the " manufacture of pyroligneous acid." These are, first, manufacturing pyroligneous acid from sawdust, wood turnings, wood chips, spent dyewoods, spent tan, turf, or similar ligneous vegetable substances, by causing such substances to pass in continuous motion through heated iron or other tubes or retorts, and the " use " of the machinery or apparatus." The sawdust, &c. is fed into a hopper attached to vertical feed pipes in which worms or screws revolve; the retorts are placed below horizontally, having revolving screws, which passes the material forward to be distilled; the vapours pass upwards to the main to be condensed, and the charcoal is passed from the retorts by a pipe into a vessel containing water. Second, " manufacturing pyroligneous acid by " forcing a current of heated air through branches or billets of " wood, sawdust, wood turnings, wood chips, spent dye woods, " spent tan, turf, or similar ligneous vegetable substances."

[Printed, 10*d*. Drawing. Mechanics' Magazine, vol. 50, p. 309; Artizan, vol. 7, p. 208; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 234; Patent Journal, vol. 6, p. 257.]

A.D. 1848, October 19.—N° 12,290.

HILLS, Frank Clark.—" Improvements in treating certain " salts and gases or vapors." The improvements relating to this subject are, first, " distilling the volatile solutions of ammonia, " whether pure or mixed with other matters, by running them " down through greatly divided media" (small coke or breeze, clinkers, broken tiles, or earthenware) " in any convenient cham- " ber or still, and admitting steam or heated air in an opposite " direction to come into direct contact with the solutions so as to " vaporize and drive off the more volatile parts."

Second, concentrating ammoniacal solutions obtained as above by treating them in the same way as above.

Third, driving off the more aqueous vapours of sulphuric acid by treating them likewise similarly, only the " media must be broken " glass, earthenware, or pebbles," &c. " Weak sulphuric acid " will be distilled off by the heated air, &c., and the concentrated " acid will run out at the bottom of the still."

Fourth, " impregnating liquids with gases or vapors (ammo- " niacal vapors) when mixed with other gases," by passing them through a chamber containing " sawdust, tan, cocoa-nut fibre, or " pumice stone broken small," in trays. The liquid for absorbing the vapors is run into the tower at the top. Another method is to pass the gases " through a horizontal cylinder, in the centre of " *which an axis or spin*dle is placed, passing through the ends or

" covers of the cylinder, and to which spindle brushwood, or " furze, or matting" is attached, the extremities of which pass through water, and the spindle revolving, the matting carries some of the water up with it, and so washes the gas of the ammonia. Another method is to soak breeze or coke, &c., in preference in sulphuric acid, drying it, and placing it in vessels like dry lime purifiers; the ammoniacal vapours are absorbed in passing through it, forming sulphate of ammonia, &c.

Fifth. " Introducing the liquids either into the stills or the " absorbing vessels," by means of perforated pipes filled by a tumbler. Or, placing an upright hollow spindle closed at bottom with one or more pipes radiating from it; these pipes have holes drilled in them on one side so as to rotate.

Sixth, depriving gas of naphthaline by passing it through a solution of caustic potash or soda and lime.

See also Abridgements of Specifications upon Gas.

[Printed, *4d.* No Drawings. Mechanics' Magazine, vol. 50, p. 403; Patent Journal, vol. 7, p. 117.]

A.D. 1848, October 26.—Nº 12,297.

LONGMAID, William.—" Improvements in treating the " oxides of iron, and in obtaining products therefrom." These are, mixing oxides of iron with carbonaceous matter, such as tar or rosin, and distilling them in a furnace with the cover of the vessel downwards, so as to burn the volatile products, and when all volatile matter has ceased to come off heating for two hours, and cooling out of the atmosphere, the result is a black or dark-colored pigment. When the mixed products are distilled in the usual way, a volatile oil is produced, and also gas " suitable for " the purpose of illumination."

[Printed, *4d.* No Drawings. Repertory of Arts, vol. 13 (*enlarged series*), p. 375; London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 265; Mechanics' Magazine, vol. 50, p. 426; Patent Journal, vol. 7, p. 39; Engineers' and Architects' Journal, vol. 12, p. 179.]

A.D. 1848, November 21.—Nº 12,333.

McDOUGAL, Alexander, and RAWSON, Henry.—" Improvements in the manufacture of sulphuric acid, nitric acid, " oxalic acid, chlorine, and sulphur." These are, first, the use of rice in place of sugar in manufacturing oxalic acid.

Second, manufacturing " nitric acid by passing the lower oxides " of *nitrogen alternately into* water or an aqueous solution of "acid, and air containing oxygen, whether these lower oxides "may be obtained in the manufacture of oxalic acid, or in any "other process."

Third, manufacturing sulphuric acid by drawing air and sulphurous acid gas through a series of vessels, "the first one-third "full of nitric acid, and all the others one-third full of water." Sulphuric acid is thus produced "without the loss of any nitric "acid."

Fourth, making chlorine by treating "any of the chromates or "bichromates with hydrochloric acid, either in its free or nascent "state." The resulting chloride is distilled with nitric acid, and the hydrochloric acid given off is collected. The resulting nitrate is distilled, and the lower oxides of nitrogen are oxidized and condensed as described under the first head.

Fifth, manufacturing sulphur by "passing sulphuretted hy-"drogen through a heated tube, by which the gas is decomposed, "sulphur being deposited and hydrogen given off."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 14 (*enlarged series*), p. 22; London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 348; Mechanics' Magazine, vol. 50, p. 498; Patent Journal, vol. 9, p. 57.]

A.D. 1848, December 2.—Nº 12,354.

COLLINS, Robert Nelson.—"Certain improved compounds "to be used for the prevention of injury to health under certain "circumstances." These are, substances "which have the pro-"perty of evolving chlorine when these are moistened or mixed "with water." In preference chloride of lime is mixed with sulphate of alumina in certain proportions. Chloride of magnesia may be used in place of chloride of lime and "salts of "the peroxide of iron, oxide of zinc (oxide of lead) or oxide "of manganese" may be used in place of the sulphate of "alumina."

[Printed, 4*d*. No Drawings. Mechanics' Magazine, vol. 5, p. 543; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 166; Patent Journal, vol. 9, p. 45.]

A.D. 1848, December 9.—Nº 12,359.

YOUNG, James.—"Improvements in the preparation of certain "materials used in dyeing and printing." These are, first, making stannate of soda by mixing in proportions, which may vary, tin ore, known in Cornwall as "black tin," reduced to powder, with caustic soda liquor, stirring well while gradually raising the temperature to between 500° and 600° F. When the action is complete the mass is cooled, dissolved in water, and the clear liquor may be employed or evaporated to dryness, or the stannate crystallized from it.

Second. Making stannate of soda by mixing the ore as above with nitrate of soda in certain proportions, heating to redness, passing steam over the mixture, and collecting the nitric and nitrous acid fumes in water; the residue is treated as above.

Third. Substituting for the nitrate of soda above chloride of sodium (common salt), and pursuing the same process, " thereby " obtaining stannate of soda with muriatic acid."

Fourth. Making stannate and stannite of soda by subjecting metallic tin mixed with an equal weight of solid hydrate or caustic soda to a red heat; with stirring, stannite of soda is formed. This stannite is converted into stannate by boiling with water; metallic tin precipitating in powder leaves stannate of soda in solution; or metallic tin, solid caustic soda, and oxide of manganese, all in certain proportions, are subjected to a red heat in an open pot with constant stirring. Ultimately the mass is dissolved, and the supernatant liquid is used as it is, or evaporated as above; the precipitated oxide of manganese may be collected and used over again. The stannite formed as above may be converted into stannate by keeping it freely exposed at a red heat to the atmosphere; but the oxidizing process of the manganese is preferred.

Fifth. Making as above stannate of soda from oxide of tin obtained by passing a current of steam or air over metallic tin when heated to redness.

Sixth. Making stannate of potash by each and every of the methods described above, only using potash in place of soda salts.

Seventh. Making stannite of potash by the same process as stannite of soda above, only substituting potash for soda.

Eighth. Making as above stannate of lime, or of the other alkaline earths, by substituting a hydrate or nitrate or muriate of lime or of an alkaline earth for the soda or its salts, and obtaining peroxide of tin soluble in acids by adding an acid such as muriatic acid, which, combining with the lime, liberates the peroxide of tin.

Ninth. Making peroxide or binoxide of tin or stannic acid by passing carbonic acid into a solution of stannate of soda or of potash, or over the dry or damp salts; the carbonate of soda formed is washed from the peroxide. Sulphuric acid, &c. added to a solution of stannate also liberates it, as does bicarbonate of soda or potash, or bisulphate of soda or potash, the alkali of the stannate being converted into carbonate or sulphate, which may be separated by filtering or decanting.

Tenth. Making any of the salts of tin by treating the peroxide obtained from the above stannates as described with the necessary acid, as, for example, in making "oxymuriate of tin, otherwise "bichloride of tin," "add peroxide of tin to muriatic acid until "the last portion added remains undissolved. The clear liquor is "the oxymuriate ready for use."

[Printed, 4*d*. No Drawings. Mechanics' Magazine, vol. 50, p. 568; Patent Journal, vol. 9, p. 44.]

A.D. 1848, December 21.—N° 12,380.

WILDSMITH, James Henry Staple.—"Improvements in "the purification of naptha, likewise called wood spirit, and "hydrated oxide of methyle, pyroligneous acid and eupion, and "certain other products of the destructive distillation of wood, "peat, and certain other vegetable matters, and of acetate of "lime and shale, and in the purification of coal tar and mineral "naptha, likewise spirit, being the products of fermentation." These are, first, applying "substances capable of yielding up their "oxygen, or a portion of it, in the reduction of or combination "with the carbohydrogen or odour-giving substance." The substances "consist of permanganate of potash, bichromate of potash, "chromate of potash, and other highly oxidized bodies." In the purification of pyroligneous acid and acetate of lime, "permanganate of potash or bichromate of potash in the state of "fine powder," or "an equivalent proportion of acid," is added in certain proportions.

Second, "The spontaneous action of light in assisting and "being essential to such reduction or combination."

Third, "The application of vessels permeable to light for the "above purposes."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 14 (*enlarged series*), p. 101; Mechanics' Magazine, vol. 50, p. 620; Patent Journal, vol. 18, p. 175.]

A.D. 1849, February 14.—N° 12,479.

PATTINSON, Hugh Lee.—"Improvements in manufacturing "*a certain compound* or certain compounds of lead, and the "*application of a certain* compound or certain compounds of lead

" to various useful purposes." These are, first, manufacturing " oxichloride of lead " composed of " one atom of chloride of lead " and one atom of oxide of lead, with or without an atom of " water," or as near this composition as may be, by the use of " chloride of lead and lime, soda, potash, ammonia, or barytes." It is preferred to use lime, and on mixing lime water and chloride of lead in solution, both in certain proportions, this substance " is " instantly formed " and subsides.

Second, " the application and use of this oxichloride of lead as " a white paint and as a base for colored pigments, as an adhesive " cement for joints, and for many other purposes to which white " lead is commonly applied."

[Printed, *4d.* No Drawings. Repertory of Arts, vol. 14 (*enlarged series*). p. 150; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 114; Mechanics' Magazine, vol. 51, p. 163; Patent Journal, vol. 9, p. 131; Engineers' and Architects' Journal, vol. 12, p. 301.]

A.D. 1849, February 28.—N° 12,497.

ROWLANDSON, Thomas.—" Improvements in the treatment " of certain mineral waters to obtain products therefrom, and in " obtaining certain metals from certain compounds containing " those metals, and in obtaining other products by the use of " certain compounds containing metals."

These are, first, " precipitating copper from its solution by " means of alkaline earthy and metallic sulphurets."

Second, separating " zinc from those ores in which it exists along " with copper, lead, silver, and gold, either singly or collectively," by grinding and roasting the ore, washing out any sulphate of zinc formed from the oxide which is dissolved in sulphuric or muriatic acid; any copper in solution is precipitated by " sulphuret " of sodium." The metals remaining are separated by " the processes usually employed."

Third, preparing stannates of soda and of potash by heating together " in a reverberatory furnace tin ore, oxide of tin, or other " matters containing tin " with carbonate of soda or of potash in certain proportions. The insoluble matter is removed by lixiviation.

Fourth, obtaining sulphate of soda by heating at a low temperature in a reverberatory furnace a mixture of common salt, bisulphuret of iron, and metallic iron in a state of powder, and in chemical equivalents, and lixiviating the residue. Also " by

" heating common salt with a mixture of bisulphuret of iron and " the subsulphate of iron " deposited from certain mineral waters and lixiviating the residue.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 14 (*enlarged series*), p. 228; Mechanics' Magazine, vol. 51, p. 212; Patent Journal, vol. 7, p. 238.]

A.D. 1849, February 28.—N° 12,498.

ROCHAZ, Charles André Felix.—" Improvements in the " manufacture of oxide of zinc and in the making of paints and " cements when oxide of zinc is used." These are, in reference to this subject, in the furnaces for obtaining the oxide from the metal and its ores, and first in making oxide from the metal " obtaining " spaces over the crucibles " (which have lids with holes in the top, but which lids are removed when the process is at full work), " causing streams of air to impinge on the melted zinc ;" also " the using of rows of bands ; and also the using of woven fabrics " in making the rooms or chambers ;" these bands, &c. are stretched from top to the bottom of the condensing chambers, so as to catch the oxide upon them.

Second, in furnaces " for producing white zinc from zinc ores," arranging passages for the air to oxidate the distilling metal beyond the " crucibles or retorts," and for conducting the oxide into the condensing chamber.

Third, the " blast furnace for obtaining zinc white from zinc " ores ;" this consists of two outer chambers filled with the ore mixed with fuel ; in the interior of these are two smaller chambers full of charcoal or coke ; these chambers are all covered at the top ; between these two fuel chambers is what is termed an oxidating flue leading to the condensers ; these chambers all unite at the bottom and come into one chamber filled with charcoal or coke, near the bottom of which and at each side are tuyers.

[Printed, 1*s*. 4*d*. Drawings. Repertory of Arts, vol. 15 (*enlarged series*), p. 83 ; London Journal (*Newton's*), vol. 36 (*conjoined series*), p. 1 ; Mechanics' Magazine, vol. 51, p. 213 ; Patent Journal, vol. 7, p. 260.]

A.D. 1849, March 5.—N° 12,503.

JENNINGS, Henry Contsantine.—" Improvements in the " manufacture of vehicles for mixing pigments, and also in the " manufacture of white lead.

[No Specification enrolled.]

A.D. 1849, March 5.—N° 12,505.

BALMAIN, WILLIAM HENRY, and PARNELL, EDWARD ANDREW.—" Improvements in the manufacture of glass and in " the preparation of certain materials to be used therein, part of " which improvements are also applicable to the manufacture of " alkalies." These are, first, preparing " silicate of soda, silicate " of potash, and silicate of barytes, and the double silicates of " these bases, by heating their respective sulphates with sand and " carbonaceous matter." The proportions of the substances employed vary with the nature of the result required; in one no charcoal is employed. The materials in preference are fluxed in a furnace afterwards described.

Second, " the use of a sulphuret or hyposulphite in the place of " carbonaceous matter in making silicates, and in place of charcoal " as heretofore used in making glass by means of a sulphate." Among the sulphuretes which may be employed for this purpose " is the refuse lime of gas works."

Third, the use for the above purposes of a furnace made as follows: —The fire-place is " built after the manner of ordinary reverberatory " furnaces," from it there runs two inclined beds or flues which are arched over; the beds, &c. are made " of the most refractory " materials." " The materials are introduced at the top of the " inclined beds or flues through an opening " " in the roof by a " moveable hopper," and are raked by means of " a bent rod in- " troduced through a hole in the side." The materials as they flux run down and out by an opening " near the fire bridge." In preference, " a blast of air by a circular fan " is employed, the pipe for which terminates " in the ashpit, about a foot below the " fire-bars." " When the blast is used the front of the ashpit is " closed by a door."

Fourth, " the preparation of silicate of soda by exposing a heated " mixture of sand and common salt, first to the action of air and " sulphurous acid and afterwards to carbonaceous matter or other " deoxidizing agent." Also preparing " sulphate of soda in a " fit state for glass or alkali making by exposing salt or a mixture " of salt, with sand or other inert substance, to the united action " of heat, air, and sulphurous acid."

Fifth, separating " carbonate of soda from the mixture of car- " bonate " and sulphuret " produced during the decomposition " of the sulphate by " carbonaceous matters;" by lixiviation and evaporation, the carbonate crystallizes and a solution of the sulphuret remains.

[Printed, 8*d.* Drawing. London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 225; Mechanics' Magazine, vol. 51, p. 237; Practical Mechanics' Journal, vol. 2, p. 156.]

A.D. 1849, March 20.—Nº 12,530.

PICKERING, Charles William Harrison. — "Improve-" ments in evaporating brine and certain other fluids." These are, first, so "arranging boiling and evaporating pans that they, " being divided, may, by means of openings or sluices, cause " the brine or other fluid when heated to circulate, and in such " manner that the heavier will move through the opening or " openings at the bottom, and then become heated and expanded, " will rise and flow out into the other part of the pan through the " openings at the top or upper part."

Second. The peculiar construction of pan in combination with steam pipes, whereby one end of the pan, being considerably deeper than the other, admits of receiving the steam pipes in such manner as to leave a space below them" so "that the salt, cop-" peras, or other matter which is deposited under the pipes may be " easily drawn to the sides of the pan and there removed," and " so that the brine or fluid in entering the deeper part of the " pan has to descend, and becoming heated gradually ascends and " flows back into the shallow part, thus when aided by the open-" ings or sluices keeping up a continuous circulation through-" out." The part of the pan which contains the steam pipes or tubes is so deep that the top of tube is on a level with the bottom of the shallow part of the pan, and leaves a depth under them, there is an incline where the deep and shallow parts of the pan join, "in order that the colder fluid may at once freely descend " to the bottom and diffuse itself under the steam pipes." A pan or vessel is placed above or at the side of this evaporating pan for the purpose of heating the cold brine or fluid by means of the steam which has passed through the pipes.

[Printed, 6*d.* Drawing. Repertory of Arts, vol. 14 (*enlarged series*), p. 263; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 261; Mechanics' Magazine, vol. 51, p. 285; Patent Journal, vol. 7, p. 261.]

A.D. 1849, March 26.—Nº 12,536.

WHITE, Stephen.—"Improvements in the manufacture of " gases, and in the application thereof to the purposes of heating

“ and consuming smoke; also improvements in furnaces for “ economizing heat, and in apparatus for the consumption of “ gases. These are, in reference to this subject, the manufacture of oxygen gas by exposing the material (nitrate of soda or nitrate of potash), from which it is to be obtained, “ to heat in detached “ and moveable crucibles, placed within retorts of any suitable “ construction heated in any ordinary way.” The residues so obtained from either nitrate of potash or nitrate of soda are “ valuable articles of commerce, and may be used for a variety of “ purposes,” but in preference treating such residues as follows:— “ Mixing the same with nitric acid, diluted with twice its volume “ of water, and placing the mixture in a boiler of clay or iron, and “ then evaporating the water, the result of which process is, that “ nitrate of potash or nitrate of soda will remain (according to “ the residuum that has been used), and such nitrate of potash or “ nitrate of soda may be returned into the crucibles for the pro- “ duction of oxygen gas.” The other processes in this Specification have reference to gas making.

[Printed, 2*s*. Drawings. Mechanics' Magazine, vol. 51. p. 309; and vol. 55, p. 23; Patent Journal, vol. 8, p. 2.]

A.D. 1849, March 28.—Nº 12,541.

WILSON, James Thomson.—“ Improvements in the manu- “ facture of sulphuric acid and alum.” These are, in reference to sulphuric acid, constructing “ the upper part or body of the “ chamber” as now employed in the manufacture of glass in place of lead; using “ numerous pieces, panes, or sheets.” The glass, which is plate, is set in framework of wood, “ slips or fillets of “ glass” are converted on the face of the bars, &c.

Second, in making alum, in place of adding the cold acid or liquors to the shale to dissolve the alumina, as is now “ the prac- “ tice,” “ heating the liquors for digesting shale in a separate “ vessel.”

Second, using “ the mother liquors to combine with ammoniacal “ liquors and thus to form sulphate of ammonia” and not using them “ to dilute the acid.” Ammonia is added to the mother liquors, in quantity not sufficient “ as completely to neutralize the “ acid,” and the solution is concentrated and crystallized.

[Printed, 10*d*. Drawing. Repertory of Arts, vol. 14 (*enlarged series*), p. 257; Mechanics' Magazine, vol. 51, p. 334; Patent Journal, vol. 9, p. 80.]

A.D. 1849, April 26.—N° 12,585.

SIMPSON, George, and FORSTER, Thomas.—" Improvements " in the manufacture or treating solvents of india-rubber and other " gums or substances." These are, in reference to this subject, manufacturing chloride or bichloride of carbon and applying the same as above. A retort is charged with bisulphuret of carbon, the neck of which enters nearly to the bottom into a vessel three parts full of pentachloride of antimony; the retort and vessel are both heated by steam jackets, a tube from the vessel connected with a worm tub condenses the chloride of carbon as it distils over. The product is redistilled with lime. When the whole of the available chlorine is " absorbed from the antimony," it is re-saturated " with chlorine by the usual means and so render it " again serviceable."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 14 (*enlarged series*), p. 344; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 332; Mechanics' Magazine, vol. 51, p. 428; Patent Journal, vol. 8, p. 80.]

A.D. 1849, June 7.—N° 12,642.

MASTERS, Thomas.—" Certain improvements in the construc-" tion and arrangement of apparatus for cooking, for heating and " evaporating fluids, and obtaining decoctions and infusions from " certain vegetable and animal matters, part of which improve-" ments are applicable to certain chemical purposes." These are, in reference to this subject, apparatus for the " evaporation of " fluids holding salts or other articles in solution," consisting of a double vessel with a space between it, which is supplied with steam by a pipe from a boiler, the said space being allowed to contain water or otherwise, as desired. The solution to be evaporated is placed within the inner vessel, to which the steam has access by two descending pipes, which may either have a loaded safety valve escape, or free egress to the atmosphere, as may be most desirable; a tap is attached to a tube which passes through the outer vessel and space into the inner vessel, so as to draw off the concentrated solution, and there is another tap for removing the condensed water from the space. A second apparatus is described without the descending steam pipes, and in which the steam " is simply allowed to circulate through the space, and " escape by a free or loaded escape aperture, according to the " temperature required." The remainder of this Specification is occupied with descriptions of apparatus for cooking, &c. constructed generally after the above principle.

[Printed, 2*s.* 6*d.* Drawings. Mechanics' Magazine, vol. 51, p. 573; Patent Journal, vol. 8, pp. 176 and 187.]

A.D. 1849, August 1.—Nº 12,724.

RODGERS, JULIAN EDWARD DISBROWE.—(*A communication.*) —"Improvements in the manufacture of white lead."

These are, first, "the use of a room or chamber" "capable of "being rendered air-tight or nearly so when necessary, and into "which the supply of carbonic acid gas and acetic acid, or pyro-"ligneous acid and aqueous vapors, can be controlled or regu-"lated." In preference vessels or troughs are on the floor, containing a fluid undergoing fermentation, and "thus to supply "carbonic acid gas," and also vessels furnished with pipes communicating with a steam boiler, and containing "pyroligneous "acid, sour beer, acid wine," &c. Bent sheets of lead are suspended on frames, and if the room is not above 70° F., the temperature is raised by "steam pipes or flues until it is between 70° or 80° F." Steam passes into the vessels containing the acid liquors, and rises in vapour along with them into the chamber. Carbonic acid may be obtained by acids acting on carbonates and the combustion of coke, &c.

Second, the introduction of steam into the converting chamber "either alone" or as above.

[Printed, 4*d.* No Drawings. Repertory of Arts, vol. 15 (*enlarged series*), p. 172; London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 181; Mechanics' Magazine, vol. 52, p. 114; Patent Journal, vol. 8, p. 247.]

A.D. 1849, August 1.—Nº 12,730.

MURDOCH, JAMES.—(*A communication.*)—"Certain improve-"ments in converting sea water into fresh, and in ventilating "ships and other vessels, applicable also to the evaporation of "liquids, and to the concentration and crystallization of syrups "and saline solutions."

These are, first, "the employment of a current of air produced "by an exhausting fan, combined with a condenser," constructed in the lower part of the vessel, consisting of "a tank fitted with a "cover and divided horizontally into two compartments," the lower one of which compartments forms the cold water cistern,

" for the purpose of accelerating evaporation in the conversion of " sea water into fresh by distillation, and in the distillation of " alcoholic and other spirituous liquids."

Second. The use of the same " in the concentration and crystal- " lization of syrops and saline solutions."

Third. " The employment for the evaporation of liquids of an " evaporating vessel, composed of a series of metallic compart- " ments, forming a continuous zig-zag channel," whether " such " vessel be closed and connected or not with an exhausting fan, " for the purpose of distillation, or whether it be employed simply " as an evaporating vessel."

Fourth. " Ventilating of ships by means of descending and " ascending currents of air, produced by means of an exhausting " fan," and " combining such method of ventilation with the " process hereinbefore described of converting sea water into " fresh."

[Printed, 10*d*. Drawings. Mechanics' Magazine, vol. 52, p. 115; Patent Journal, vol. 8, p. 259.]

A.D. 1849, October 12.—N° 12,807.

MERCER, John, and BLYTHE, William.—" Improvements " in certain materials to be used in dyeing and printing." These are, " making double salts in a solid or concrete state composed of " oxide of tin, or stannic acid, and phosphoric acid, arsenic acid, " or arsenious acid and soda, which are or may be called phospho- " stannate of soda arsenio-stannate of soda, &c." In preference, the arsenio-stannate of soda is used, and it is made by " adding " to stannate of soda arseniate of soda (made by fluxing or heating " equal weights of white arsenic and nitrate of soda together) in " such proportions as form the strongest solid or concrete salt; " this is about equal equivalents of arsenic acid and stannic acid."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 15 (*enlarged series*), p. 293; London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 38; Mechanics' Magazine, vol. 52, p. 317; Patent Journal, vol. 9, p. 19.]

A.D. 1849, November 2.—N° 12,827.

COWPER, Charles.—(*A communication.*)—" Certain improve- " ments in the treatment of coal, and in separating coal and other " substances from foreign matters, and in the manufacture of " artificial fuel and coke, and in the distillation and treatment of " tar and other products from coal, together with improvements " in the machinery and apparatus employed for the said pur-

" poses." These are, in reference to this subject, collecting the superfluous tar and ammoniacal liquor, as follows :—In the lateral walls of the oven are fixed two channels or flues of cast-iron, communicating at their lower parts with a box extending the whole length of the oven ; a sheet iron tube constantly full of water serves to keep the channels above referred to cool. The steam produced passes by a small opening into a channel or flue, one side of which is formed by the coal itself. The upper part of the channel is closed by a plug. The interior of the channel is not in communication with the upper part of the oven under the arch or cover where the flames are. The box above referred to is in communication with all the channels on one side of the oven, and communicates with four flues by means of worm pipes immersed in cold water. "Central passages are formed in the coal," and a flue provided with a door passes through the wall at each side into the above four flues. "By opening and closing the doors the currents " may be made to ascend and descend at pleasure." "The " vapours of tar mixed with steam cannot inflame, and will be " condensed partly in the box" above referred to, "and partly in " the worm pipes before reaching the flues."

[Printed, 2*s*. 8*d*. Drawings. Mechanics' Magazine, vol. 52, p. 377; Patent Journal, vol. 10, p. 93; Journal of Gas Lighting, vol. 2, p. 10.]

A.D. 1849, November 29.—N° 12,868.

BARLOW, Charles.—(*A communication.*)—"Improvements in " the manufacture of a certain pigment." These are, first, "the " application of deoxidising gas containing carbon in the manu- " facture of zinc white," as follows :—Air is blown, by means of a fan, through a pipe into a furnace containing charcoal heated to a bright red, and the gases arising are conveyed into a pipe which leads to a furnace containing red hot crucibles, into which red hot zinc is poured ; when the gas is found to burn with a steady purple flame it is allowed to flow into the crucibles through small holes in the pipe surrounding the aperture or in the crucible cover, while air which has been heated in its passage from the fans is admitted into the oxidizing chamber. As the vapour of the zinc rises that and the gas burn together, "the zinc being converted into oxide of zinc at the same " time that the carbonic oxide gas is converted into carbonic acid, " and these two in part combine, forming a mixture of oxide and " carbonate of zinc;" but it is stated cyanogen is formed in the charcoal furnace, through which the air is blown, "which com-"bines also with a portion of zinc vapour, forming cyanide of "zinc, which either passes into the receiver in that state or is "again decomposed into carbonate of zinc and nitrogen; in either "case a snow white product is the result." The product is blown, together with the excess of air, through a passage into a receiver. In another arrangement the zinc to be oxidized is retained in curved tubes, and the gas, &c. are applied as before.

Second. "The converting of impure oxide of zinc into pure "zinc white," as follows:—Any imperfect oxide of zinc, which he denominates "cones," formed about the apertures of the crucibles or tubes from an insufficient supply of gas are collected, and, with any other dirty or impure oxide that may be used, are placed in what is termed the "completing furnace," consisting of an arrangement of tubes raised to a bright red heat, a quantity of the imperfect or dirty oxide is placed in them through apertures by means of a semicylindrical scoop, and heated air passed "through "the tubes into the receiver completes the oxidation of the zinc, "and at the same time converts the vegetable matter that may be "mixed with it into gaseous substances." When the quantity in the tubes enlarge it is "necessary to rake it over from time to "time," and when white fumes cease to be given off, the residue "in the tubes may be pushed through into the receiver, as it will "then consist of pure oxide, there to be converted as above "described into carbonate."

Third. "The use of a receiver having moveable screens in the "said manufacture."

Fourth. Subliming of the arsenic which may be contained in zinc white by "heating it to about 400 Faht., by which the arsenic "is sublimed and may be collected. For this purpose it is put "into earthen vessels and then placed in an oven, from the top "of which a pipe carries off the arsenical vapour into a cold "receiver, where the vapour will condense in a solid form" (arsenious acid).

[Printed, 1*s*. 10*d*. Drawings. Mechanics' Magazine, vol. 52, p. 436; Patent Journal, vol. 11, p. 38.]

A.D. 1849, December 10.—N° 12,881.

ECARNOT, Jean Baptiste.—"Improvements in the manu-"facture of sulphuric, sulphurous, acetic, and oxalic acids and "nitrates."

These are, first, when nitric acid is in contact with a body so as to form oxalic acid, "bi-oxide of azote will escape;" this is conveyed in preference into a column of tubes of earthenware, filled in preference with pieces of pumice-stone, and air to supply oxygen is forced in by a blowing machine, and "a flow of steam "is brought from the boiler with a small supply of water" from a reservoir. The "azotic acid" thus produced is of considerable strength.

Second, acetic acid is obtained by passing air "heated to about "120° to 130° C." through alcohol.

Third, sulphurous acid is obtained by heating sulphur in a retort, and passing air over it "by means of a double air pump," and passing it "into water or into a base to make a sulphate."

Fourth, sulphuric acid is "obtained by treating the sulphurous "acid thus obtained with a further injection of atmospheric air "and steam in an upright tube filled with pumice-stone."

Fifth, "when making nitrates a bi-oxide of azote is disengaged, "and treated according to the process above described for making "oxalic acid."

[Printed, *4d.* No Drawings. Repertory of Arts, vol. 16 (*enlarged series*), p. 36; London Journal (*Newton's*), vol. 36 (*conjoined series*), p. 388; Mechanics' Magazine, vol. 52, p. 478; Patent Journal, vol. 9, p. 140.]

A.D. 1850, January 26.—N° 12,944.

RICHARDSON, THOMAS.—"Improvements in the manufac-"ture of Epsom and other magnesian salts, also alum and sul-"phate of ammonia."

These are, first, employing the alkaline earths and also sulphurets of the alkalies and alkaline earths "for separating the "impurities from solutions of sulphate of magnesia;" of the alkaline earths magnesia is preferred, as is the sulphuret of magnesium over the other sulphurets. The solution is evaporated from the precipitate. Also making the double sulphate of magnesia and ammonia by neutralizing impure sulphate of magnesia with gas liquor, separating the precipitate and evaporating the liquid. Or by submitting the pure sulphate in solution or damp to ammoniacal gas by distilling gas water, guano, &c. with quicklime, passing the gas through water.

Second, in the manufacture of alum, "lixiviating the calcined "shale," employing an arrangement of pits with pipes so arranged that water flows from one into the other from a service tank.

Third, manufacturing sulphate of magnesia by subliming the double sulphate of magnesia and ammonia "in the way usually "practised in preparing sal-ammoniac."

[Printed, 6*d*. Drawing. Repertory of Arts, vol. 16 (*enlarged series*), p. 147; London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 82; Mechanics' Magazine, vol. 53, p. 96; Patent Journal, vol. 9, p. 202.]

A.D. 1850, February 21.—N° 12,975.

CORMACK, WILLIAM.—"Improvements in purifying gas, also "applicable in obtaining or separating certain products or "materials from gas water and other similar fluids."

These are passing a gas through a mixture of a sulphate of a metal decomposed by sulphuretted hydrogen and a soluble chloride, or adding such a mixture to gas liquor or other such liquids. The gas is passed in preference through a mixture of protosulphate of iron and chloride of sodium in certain proportions, either in solution or in the dry state, until by acetate of lead-paper or by turmeric sulphuretted hydrogen or ammonia are observed in the gas. These salts in similar portions are added to gas liquor and such liquids. In both cases insoluble sulphuret of iron is formed, and sulphate of soda and chloride of ammonium or sal-ammoniac; the two last dissolve or are in solution, and are decanted, and the two last salts are again separated from each other by crystallization, as is well known.

[Printed, 4*d*. No Drawings. Mechanics' Magazine, vol. 53, p. 157; Patent Journal, vol. 9, p. 262.]

A.D. 1850, February 27.—N° 12,982.

TODD, BRERETON.—"Improvements in the manufacture of "arsenic, sulphuric acid, and the oxide of antimony from copper "and other ores in which they are combined, and also the oxide "of zinc."

These are, first, submitting copper and other ores without any previous roasting "to the action of a blast furnace in connection "with flues and chambers of sufficient size to condense the "volatile products, and by the same process obtain the metallic "substances that do not volatilize, in the state of regulus," in order to obtain the above substances and also sulphate of zinc.

Second, "employing the spare heat from the said blast furnace "in a calciner or furnace attached to the same for subliming "arsenic sulphur and other volatile substances from the above-

“ named ores.” The arsenic driven off by the blast is “ sublimed “ by the well-known processes now in general use.” The sulphurous acid is oxidated into sulphuric acid by “ steam and “ oxygen ” in the chambers. Oxide of antimony is volatilized and condensed and purified by subliming in a reverberatory furnace; any sulphurets of lead which it may contain will remain as oxide of lead “ in the reverberatory furnace.” When zinc ores are submitted “ to the same process as above described for arsenical “ ores, the volatilized zinc ” is condensed as oxide, “ the principal “ part of the sulphur with which zinc was mineralized is drawn “ off in the state of sulphurous gas, but may be converted into “ sulphuric acid as above described, and condensed with the “ oxide of zinc so as to form sulphate of zinc.”

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 16 (*enlarged series*), p. 238; London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 191; Mechanics' Magazine, vol. 53, p. 179; Patent Journal, vol. 9, p. 262.]

A.D. 1850, March 7.—Nº 12,990.

STONES, William Benson.—(*A communication.*)—“ Improve- “ ments in treating peat and other carbonaceous and ligneous “ matters so as to obtain products therefrom.” These are said to be twenty-one in number; in reference to this subject they are as follows:—In carbonizing peat in close retorts, obtaining, “ besides “ the gas, ammonia, a peculiar acid (the name of which is not “ given), and a bitumino-adipose compound which is named “ paranapththadipose,” &c. The “ paranapththadipose ” is submitted to distillation, using “ two condensing pipes placed one “ above the other, or one beyond the other, in a falling oblique “ position;” a number of products are obtained, and it is stated the following products are obtained or educed according to the nature, quality, or composition of the peat and the temperature at which are collected and condensed “ the vapours in their flight “ from the still, and by having recourse to the various means and “ chemical combinations and modes of treatment known as “ leading to such results, such as pyroligneous, phocenic, and “ ulmic acids:” “ sulphuretted hydrogen, bisulphuret of hydro- “ gen, hydro-sulphate of ammonia (sal ammoniac),” “ tannic, “ gallic, pyrogallic, and metagallic acid,” &c., &c.

[Printed, 1*s*. 2*d*. Drawing. Repertory of Arts, vol. 17 (*enlarged series*), p. 16; Mechanics' Magazine, vol. 53, p. 219; Patent Journal, vol. 9, p. 284.]

A.D. 1850, March 26.—N° 13,023.

ROTCH, Thomas Dickason.—(*A communication.*)—"Improve-"ments in separating various matters usually found combined in "certain saccharine, saline, and ligneous substances." These are, in reference to this subject, first, the application of the hanging weight suspended from the socket, with its hemispherical flange or other contrivance, for allowing motion in the nature of a universal joint to centrifugal machines for separating the various matters usually found combined in certain saccharine, saline, and ligneous substances, and for the purpose of preventing or counteracting the oscillation of the drum on its axis when in rapid motion.

Second, "the application of the friction rollers and bearers" "to the vertical axis of such centrifugal machines;" three conical friction rollers are placed under the pivot, and the bearings placed above the friction rollers.

Third, "the application of centrifugal machines to the treat-"ment of saline matters." "The salt to be operated upon is "placed in the drum of the machine in a damp state and diluted "with fresh or salt water. The drum being put in motion the "liquid parts force themselves out while the salt attaches itself to "the inner wall of the drum, and in this state the salt is ready "for use. If required to form the salt into shapes metal moulds "are used, having their sides pierced with numerous small holes. "These are filled with salt in a damp state, and ranged round "the inside of the drum which is then put in motion." The remainder of this Specification has reference to the treatment of saccharine and ligneous substances.

[Printed, 10*d*. Drawing. London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 229; Mechanics' Magazine, vol. 53, p. 275; Patent Journal, vol. 10, p. 5.]

A.D. 1850, April 23.—N° 13,059.

LAMING, Richard, and EVANS, Frederick John.—"Im-"provements in the manufacture of gas for illumination and "other purposes to which coal gas is applicable, in preparing "materials to be employed in such manufacture, and in appa-"ratus for manufacturing and using gas; also, improvements in "treating certain products resulting from the distillation of coal, "parts of which above-mentioned improvements are applicable to "other similar purposes." These are, in reference to this subject, first, decomposing "sulphate of iron in solution by its equivalent "quantity of chloride of sodium, and having separated by known "means the resulting sulphate of soda," concentrating the solution of muriate of iron, absorbing it into sawdust or other such matter, and adding "enough hydrate of lime to decompose it into "chloride of calcium and precipitated oxide of iron." After purifying "coal gas with this mixture disposed in dry lime puri-"fiers," extracting from it "by any ordinary processes adapted "for that purpose sulphur, cyanogen, and muriate of ammonia." Sometimes modifying the above by mixing "equivalent quan-"tities of ground or granulated sulphate of iron or chloride of "sodium with the other of those salts in solution, absorbed into "sawdust or other suitable matter, and then stir in an equivalent "of hydrate of lime." After use as above, this substance "affords "by lixivation a mixed solution of sulphate of soda and muriate "of ammonia, and sulphur and cyanogen may also be extracted "from it as in the former case." Also sometimes replacing "sulphate of iron by sulphate of copper, when the resulting oxide "of course is the oxide of that metal instead of the oxide of iron."

Second. Mixing refuse sulphate of lime or gypsum previously baked at a red heat in a finely divided state with sulphate of iron or other metallic salts, such as "muriate of iron, sulphate or "muriate of zinc, sulphate or muriate of manganese, or even sul-"phate or muriate of copper;" but sulphate of iron is preferred, and purifying gas with the same alone or mixed with a porous matter. The resulting matter is made use of as a manure, or it is subjected "to certain known chemical processes for obtaining "from it an ammoniacal salt or salts, sulphur, and cyanogen."

Third. Purifying coal gas by passing it through a mixture in equivalent proportions of "hydrated or precipitated oxide of iron, "with carbonate of lime, magnesia, carbonate of magnesia or "magnesian limestone in fine powder, or else burned or slaked." "Oxide of copper may be substituted for the oxide of iron." After use and revivifying and using until spent, it "affords by "processes well known cyanogen, sulphur, and ammoniacal "products."

Fourth. Chloride of magnesium or sulphate of magnesia in solution, alone or together, are absorbed into a porous material or in a divided state though solid mixed with the porous material and placed in dry purifyers. When the gas ceases to be purified from its ammonia, the material is washed "to obtain an ammo-"niacal solution," Fifth. "Purifying coal gas by the repeated use of a solid "material containing sulphate of magnesia or chloride of magnesium, or calcium, or more than one of those reagents in combination with oxide of copper, and mixed or not with lime or "magnesia or both, or either or both of the carbonates of those "earths," until it "becomes sufficiently charged with sulphur "and with ammoniacal and cyanogen products, or either of them, "to render it worth while to extract it or them in any known "way."

Sixth. "The use of the spent materials" for "converting solutions of carbonate of ammonia, mixed or not with hydro-sulphate of ammonia, into solutions of ammoniacal sulphate;" also, changing "the sulphate of lime or sulphate of magnesia in "the said mixtures into carbonate of lime or carbonate of "magnesia."

Seventh. The use of air artificially warmed for promoting in cold weather the regeneration of the hydrated oxide of iron in mixtures which have been used in purifying gas.

Eighth. Dissolving bones or other form of phosphate of lime in hydrochloric acid for purifying gas, and mixing it with sawdust or other suitable solid matter, and placing it in dry lime purifiers. It is also used for saturating ammoniacal solutions. The use of these products as a manure is also claimed.

Ninth. Causing hodrochloric acid gas to pass in a heated state over beds of lime or carbonate of lime in its way from the furnaces, thus forming chloride of calcium. Hydrochloric acid is obtained in a concentrated state by having one conduit from the furnaces, in which are a number of vessels containing water and communicating with one another. The acid is used for making chloride of calcium by dissolving lime or its carbonate.

Tenth. "Making coke and charcoal repeatedly useful for purifying coal gas and for obtaining its ammonia by their agency." After the gas has been passed through charcoal, &c. until it no longer purifies the gas, the gas is turned in another direction, and a current of steam or heated air, &c. is sent through the foul material, and the ammonia, &c. is condensed by acids.

Eleventh. Obtaining prussiates of potash, soda, and ammonia from prussiate of lime by adding the equivalent quantities of the sulphates or carbonates of these salts to the prussiate of lime "previously dissolved in separate portions of water, and then, after "subsidence of the carbonate or sulphate of lime which forms, "to evaporate and crystallize the clear solution."

Twelfth. "Making carbonic acid gas for converting hydrosulphate of ammonia into carbonate of ammonia, and for all other purposes in the arts, by exposing a proper mixture of deutoxide of copper and carbon in powder to a red heat" in a retort, "in in the proportion of twelve parts by weight of the former to one part of the latter."

The next process is for consolidating peat; the other processes relate to gas making.

[Printed, 10*d*. Drawing. London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 328; Mechanics' Magazine, vol. 53, p. 339; and vol. 56, p. 475; Practical Mehanics' Journal, vol. 5, p. 95; Patent Journal, vol. 10, p. 105.]

A.D. 1850, April 30.—N° 13,066.

MICHIELS George.—(*A communication.*)—"Improvements in "treating coal, and in the manufacture of gas, and also in "apparatus for burning gas." These are, in reference to this subject, first, making a mixture of anthracite coal and bituminous coal in powder, and giving to them a small quantity of moisture, introducing the mixture into a brick retort, capable of holding six tons, and heating, first, to 964° F., afterwards to a clear red heat, which it would attain at the ninety-sixth hour, air having been allowed to enter some time before that. The coke is drawn from the retorts, and the ammoniacal liquors and hydrocarburets are in the condenser, and are treated as afterwards described.

Second. Treating bituminous coal in the same way to obtain coke, sulphate of ammonia, and hydrocarburets.

Third. Cleansing the coal from schistus, pyrites, &c., the latter being injurious to the quality of the ammoniacal liquors, by picking the large pieces, powdering, washing, and by means of a current of air.

Fourth. Bovey coal, Kimmeridge coal, and Broza coal (coals of tertiary formation) contain twenty-five per cent. of water, are placed on shelves in a waggon, which is run into a metal case or vessel, the cover is shut, and the whole is heated so that steam injected into the inside will not condense; the disengaged matters are condensed, in about two hours the injection of the steam is stopped. After this treatment, the coal is dry, and the hydrocarburets and ammoniacal liquors, when the coal contains nitrogen, are in the condensers.

Fifth. Treating the ammoniacal liquors, as follows:—Taking galena, which is native sulphuret of lead, reducing it into small pieces, which are roasted "in a reverberatory furnace (a series "of such furnaces) to transform a part into sulphate and "part into oxide," keeping the whole stirred so as to avoid its becoming fused, which would be the case with those parts nearest the fire. When the colour, originally metallic bluish white, changes to a redish brown or rose, it is removed into a covered vessel, and when cold is reduced to the size of coarse sand. "This material thus prepared is to be placed in tubs and "methodically washed with the ammoniacal liquids obtained "from the treatment of the coal," the object being to convert the sulphuret and carbonate of ammonia into sulphate of ammonia, the lead compounds becoming sulphuret and carbonate of lead. Any ammonia contained in these waters not transformed into sulphate is made so by the addition of sulphuric acid; these liquors are evaporated to obtain the sulphate of ammonia in a dry state. The mixture of sulphuret and carbonate of lead, the result of the treatment of the ammoniacal liquors with the mixture of sulphate and oxide of lead, when calcined with access of air, the sulphuret of lead becomes "sulphate and oxide of lead, and the "carbonate is entirely converted into oxide."

Sixth. In purifying gas upon a large scale, oxide and sulphate of lead obtained as above are employed, charged into purifiers in a wet state, and the mixture removed having become inefficient in the purifiers, is washed with the ammoniacal liquor, and finally revivified and employed again and again in the purification of gas. The sulphate of ammonia is obtained as above. The remainder of the Specification refers to obtaining the oils, and obtaining and supplying gas.

[Printed, 4*s*. 6*d*. Drawings. Mechanics' Magazine, vol. 5, p. 358; Patent Journal, vol. 10, p. 57.]

A.D. 1850, April 30.—Nº 13,067.

PROTHEROE, Evan.—(*A communication.*)—"Improvements in "the manufacture of the oxide of zinc, and in making paints from "oxide of zinc." The matters relating to this subject are, first, "the arranging of apparatus in such manner that a constant clean "surface of melted zinc is kept subjected to the action of currents of "atmospheric air; parts of the oxides thus produced being raked "out of the retort, and part passing away to the chambers." Two retorts parallel with each other are connected together, the fire passes from under one to under the other, and from thence to a reverberatory furnace placed behind these two retorts, and in communication with the first retort. The retorts are heated to "red heat by coke or other suitable fuel," the zinc melted in the reverberatory furnace runs first into one retort, and from this into the second; a rake in front is continually used "to remove "the heavier oxide" from the surface into a passage in front leading to a chamber below, while the lighter oxide volatilized "is drawn by means of air, aided by jets of steam into the "gathering chambers."

Second, "the peculiar construction and arrangement" of these chambers. The chambers consist of a series of compartments so arranged with frames "that the current of air charged with the "oxide arrives at the upper part of the chambers, and passes to "the lower part," so that the air is detained a much longer time to deposit the oxide; the frames are also placed in a horizontal position; the "frames are covered with metallic cloth, or a thin "plate of metal or wood may be used."

Third, bleaching the oxide of zinc. The heavy oxide is made white by throwing a small quantity of sulphuretted alkali "over "the surface of the zinc, more particularly after each fresh charge "of metal," also some other salts and oxides. To bleach the light oxides, they are treated "with weak acidulated water," in preference acidulated with sulphuric or acetic acids, and washed and dried.

Fourth, "grinding and compressing of the oxides of zinc by "a suitable mill, and separating the lighter oxide." The oxide is brought by rakes under a conicle roller, which is enclosed and communicates "with one or more chambers;" when air is blown upon the bed of the mill, "this current of air will draw into these "chambers all the lighter particles of the oxide as it becomes "crushed."

[Printed, 1*s*. Drawing. Repertory of Arts, vol. 17 (*enlarged series*), p. 214; Mechanics' Magazine, vol. 53, p. 357; Patent Journal, vol. 10, p. 54.]

A.D. 1850, June 1.—Nº 13,092.

DE DOUHET, Guillaume Ferdinand.—"Improvements in "the disoxygenation of certain bodies, and the application of the "products therefrom, either separately or simultaneously, to "various useful purposes." These are, in reference to this subject, first, "the fabrication of the alkaline hydro-sulphurets by means of "the deoxidation of their various sulphates by the humid and "dry processes" as follows: The solutions of the sulphates of potash, soda, ammonia are treated with solutions of sulphuret of barium, strontium, and calcium, the former preferred in quantities "proportionably to their respective equivalents," sulphurets of potassium, sodium, and ammonium are in solution, and sulphate of baryta, &c. are precipitated. Sulphurets of barium, strontium, and calcium are made in the dry way by heating in a reverberatory furnace the sulphates of these gases, mixed with coal or charcoal in certain proportions, and lixiviating the product; the sulphurets are in solution. Another mode of making these sulphurets is to heat to redness the sulphates in an iron tube open at both ends, while steam and hydrogen gas are being passed over the sulphates; charcoal, &c. may be mixed with the sulphates. If the process is continued sufficiently long the sulphurets are decomposed into the caustic state.

Second, "the application of the hydro-sulphurets" of potash, soda, and ammonia to the cleansing of woollens, cottons, and tissues, as well as the application of the first two to the fabrication of soaps, and of "artificial soda or potash." To prepare "artificial "soda or potash," a concentrated solution of the sulphuret is saturated with carbonic acid gas; carbonate of the alkali is the result.

Third, solutions of the soluble salts of the metals zinc, copper, or iron are precipitated with the sulphurets of potassium, sodium, barium, strontium, calcium; also by "poly-sulphuret of lime" prepared "by boiling together sulphur and lime in water," and likewise by "the hydrates of barytes and strontium," and the precipitates used for making colors, &c.

[Printed, 4*d*. No Drawings. Mechanics' Magazine, vol. 53, p. 458; Patent Journal, vol. 10, p. 116.]

A.D. 1850, June 11.—N° 13,113.

FONTAINEMOREAU, PETER ARMAND LECOMTE DE. — (*A communication.*)—"Certain improvements in the manufacture of "soda, muriatic, and nitric acids." These are, first, "the appli-"cation of the sulphate of alumina, and the sulphate of iron to the "decomposition of sea salt, and in general of all chlorides and "nitrates." "When the alum clays contain a sufficient quantity "of soluble matter they then may be directly mixed with sea-"salt or other chlorides." The sulphate of iron is better separated by crystallization from the sulphate of alumina. The chlorides and nitrates mixed with the sulphate are decomposed in a furnace in the usual manner, with injecting into the furnace from time to time "a certain quantity of water or steam."

Second, employing "the chlorides of manganese, of calcium, " and magnesium to extract from them muriatic acid" as above.

Third, "instead of burning the hydro-sulphuric acid," evolved in many ways from sulphurets, so as to convert it "into sulphurous " acid, and then to transform it into sulphuric acid in lead " chambers," directing "the gas mixed with an excess of air into " the chambers by making it previously traverse a layer of nitric " acid by means of cascades, or any other apparatus used to " multiply the surfaces of contact," by which it is "nearly " totally and immediately" converted "into sulphuric acid, with " a slight deposit of sulphur."

[Printed, 4*d*. No Drawings.] Repertory of Arts, vol. 17 (*enlarged series*), p. 244; Mechanics' Magazine, vol. 53, p. 495; Patent Journal, vol. 10, p. 138.]

A.D. 1850, June 11.—Nº 13,124.

GATTY, Frederick Albert.—"A certain process or certain " processes for obtaining carbonate of soda and carbonate of " potash." This consists in obtaining the above salts by decomposing solutions of either the neutral tartrate of soda or of potash with "carbonic acid gas and lime, or with carbonic acid gas and " carbonate of lime, or with carbonic acid gas and a mixture of lime " and carbonate of lime." These are brought together with agitation. The tartrate of lime is used in the manufacture of tartaric acid.

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 38 (*conjoined series*), p. 180; Mechanics' Magazine, vol. 53, p. 479; Patent Journal, vol. 10, p. 127.]

A.D. 1850, July 17.—Nº 13,177.

GOSSAGE, William Herbert.—"Improvements in obtaining certain metals from some compounds containing such " metals, and in obtaining other products by the use of certain " compounds containing metals." These are, first, "obtaining " of copper and silver, or one of these metals, also sulphate of " soda and hydrochloric acid," by the use of "burnt pyrites;" first, by "fluxing this material with 'alkali waste,' and thus " obtaining metals in the state of regulus," which are used "for " decomposing common salt, and thereby producing sulphate of

" soda and hydrochloric acid, at the same time that copper and " silver (when contained in such regulus) are brought into a state " capable of solution by water, from which solution these metals, " or one of them, can be precipitated in the metallic state, or in " the state of oxide or chloride, which can easily be reduced to the " metallic state by well-known means;" or, second, by " mixing " this material ('burnt pyrites') with common salt and small " coal, and exposing this mixture to the action of sulphurous acid " gas, so as to produce sulphate of soda and hydrochloric acid, " at the same time that copper and silver (when contained in " such burnt pyrites) are brought into a state capable of solution " by water, from which solution these metals, or one of them, " can be precipitated in the metallic state, or in the state of oxide " or chloride, which can be easily reduced to the metallic state by " well-known means."

Second. " The obtaining of sulphate of soda and hydrochloric " acid by the use of a mixture of native pyrites, burnt pyrites, " *common salt*, and small coal, made into balls, so as to provide for " these being burnt in kilns, so as to produce sulphate of soda and " hydrochloric acid, at the same time that copper and silver " (when contained in the pyrites employed) are brought into a state " capable of solution by water, from which solution these metals, " or one of them, can be precipitated in the metallic state, or in " the state of oxide or chloride, which can be easily reduced to " the metallic state by well-known means."

Third. " Obtaining of silver and sulphate of soda by the use " of regulus of copper, and of iron containing silver, by mixing " such regulus with common salt and small coal, and forming the " mixture into balls capable of being burned in kilns, so as to " produce sulphate of soda, oxide of iron, and a portion of the " silver in a soluble state, also extracting the remaining portion " of the silver by subjecting the residuum (after lixiviation) to " heat in mixture with coal, so as to reduce oxide of iron to the " metallic state, and subsequently causing such metallic iron so " obtained to decompose galena, or effecting the extraction of " the remaining portion of the silver by subjecting the residuum " (after lixiviation) to the action of hydrochloric acid, so as to " obtain silver in solution, from which it can be precipitated in the " metallic state, or in the state of oxide or chloride, which can be " easily reduced to the metallic state by well-known means."

The proportions in which it is preferred to use the materials above named are given, as is also the details of the manner in which it is preferred to use them, but in both instances these may be varied to a considerable extent.

By a memorandum of alteration entered and filed March 11, 1851, the words "common salt" in italics under the second head, which were inadvertently omitted in the Specification, are added.

[Printed, 6*d*. No Drawings. Repertory of Arts, vol. 22 (*enlarged series*), p. 125; Mechanics' Magazine, vol. 54, p. 76; Engineers' and Architects' Journal, vol. 14, p. 89; Patent Journal, vol. 10, p. 186.]

A.D. 1850, July 23.—N° 13,192.

NEWTON, William Edward.—(*A communication.*)—" Im" provements in obtaining, preparing, and applying zinc and other " volatile metals, and the oxides thereof, and in the application " of zinc or ores containing the same to the preparation or " manufacture of certain metals or alloys of metal." These are, in reference to this subject, first, in furnaces known as "the Belgian " furnace," arranging " the fire-place or places and the flue or " flues" so that "the products of combustion, after giving off " their caloric to the retorts in the chamber, may be reverberated" by a "close arched top, and carried downwards, and conducted away " through openings situated at or near the bottom;" also, " the " use of furnaces, the retort chambers of which for heating the " retorts are formed by making the front and rear walls thereof " of hexagonal blocks or forms, with central apertures to receive " the ends of the retorts," and this "whether for the reduction " of zinc or other metals."

Second, "the reduction of the ores of zinc into the state of an " oxide in an oven retort or muffle connected with a fire chamber placed at the end or side of the said oven," &c., so that the said oven, &c. " shall be heated by the products of combustion " passing through flue spaces surrounding the oven," and in which oven, &c. "the oxidation of the metallic fumes is effected by " the admission of atmospheric air through suitable openings."

Third, "the use of a porous or fibrous bag or receiving chamber, " with porous sides, or an air-tight chamber, with a strainer or " porous bag adapted to the inside thereof, and used in connection " with either a blowing or exhausting apparatus," the gases escaping through the pores of the cloth leaving the oxides, &c. Also the use of a "collecting or condensing pipe, with an elevated

" end and small orifice therein for the escape of the gases, or " otherwise a horizontal collecting or condensing pipe, with a " smaller ascending pipe at its farther extremity to aid in giving " a moderate draught to the escaping gas" attached to the retorts, ovens, or muffles.

Fourth, "the application of flanklinite" (an ore of zinc and iron) to the improvement of iron in the processes of making iron from its ores, also applying chambers and flues, &c. "for saving " the otherwise escaping fumes or products of the zinc."

[Printed, 1*s.* 10*d.* Drawings. London Journal (*Newton's*), vol. 39 (*conjoined series*), p. 235; Mechanics' Magazine, vol. 54, p. 98; Patent Journal, vol. 10, p. 249.]

A.D. 1850, July 24.—N° 13,194.

SCOTT, Langston.—(*A communication.*)—" Improvements in a " mode or modes of preparing certain matters or substances to " be used as pigments." These are, first, "the setting or bedding " a clay retort in sand or other granulated matter," or, "it may " be, broken pummice," when "used for making white zinc" (oxide of zinc) with "only a small hole at each end."

Second. The mode "of supplying zinc into the retort." There is a passage through the brickwork into the back part of the retort, the block of zinc is placed in this, and the outer part of the opening in preference is closed and luted, so as to prevent the passage of air into the retort. The "block of zinc is placed so " that as it melts it runs into the retort," and is distilled, the vapour passing out at the other end of the retort. In place of introducing the zinc at this end it may be introduced at the other end of the retort through a door opening into a chamber in front of the retort, but the zinc in such case is made first red hot so as not to cool the passage when placed in it.

Third. The mode of arranging or combining the chamber and the flue, and means of supplying air. In the front of the retort is a chamber in which there is a door opposite the end of the retort; through the door is a hole facing the opening out of the retort, through which a supply of air passes and meets the zinc vapours flowing out of the retort, and the air and vapour pass together from this chamber through a passage or flue into a condensing chamber.

Fourth. "The arrangement of apparatus for drawing off the " white zinc in a dry state." The condensing chamber has a shallow cistern at its top to contain water, or through which water is made to flow. The lower part of the chamber "is made into a " series of funnels, there being tubs or vessels placed below to " receive the white zinc in a dry state, the white zinc falling " through cloth or other flexible tubes fixed to the lower part of " the funnels."

[Printed, 1*s*. Drawings. Repertory of Arts, vol. 17 (*enlarged series*), p. 257; Mechanics' Magazine, vol. 54, p. 98; Patent Journal, vol. 10, p. 271.]

A.D. 1850, August 22.—N° 13,231.

ROTCH, BENJAMIN.—"A factitious saltpetre, and a mode by " which factitious saltpetre may be obtained for commercial " purposes." Carbonate of potash is made into caustic potash by means of lime, and the solution evaporated to a certain strength and added with stirring to a clear solution of nitrate of soda, and the whole heated to boiling and cooled "to from 54° to 50° F." " The principal portion of the nitrate of potash or saltpetre " crystallizes out of the mother liquor." The crystals are collected, washed, and dried by "the ordinary centrifrugal drying " machines," the use of which for this purpose are claimed. American potashes, "which are usually sufficiently caustic," are employed in place of the prepared caustic potash, but if they are not caustic enough "then recourse must be had to lime." "Best " pearl ashes, and the alkali obtained from the ashes of burned " tobacco, are also employed as above. The proportions in which " some of these substances are to be used are given. The mother " liquors are further evaporated and crystallized for carbonate of " soda and a little saltpetre."

[Printed, 4*d*. No Drawings. Mechanics' Magazine, vol. 5, p. 178; Patent Journal, vol. 10, p. 259.]

A.D. 1850, November 2.—N° 13,305. (* *)

DAVIDSON, JOSEPH CHRISTIAN.—"Improvements in lime " kilns," consisting in forming the main body of the kiln with a solid bottom, and in placing the furnace bars in a side passage or furnace communicating with the kiln; the lime in this arrangement cannot fall on the bars.

In furnaces for burning bricks, tiles, &c. the same method is followed, and the furnaces are placed at one side of the kiln only; the furnace is filled with arches "built reticulate."

[Printed, 1*s*. Drawings. Repertory of Arts, vol. 17 *enlarged series*), p. 334; Mechanics' Magazine, vol. 54, p. 377; Patent Journal, vol. 11, p. 60.]

A.D. 1850, November 12.—N° 13,335.

SPENCE, Peter.—"Improvements in the manufacture of "alum and certain alkaline salts, and in the manufacture of "cement, part of which improvements are applicable in obtaining "volatile liquids." These are, first, "the acting on shales or "matters by making them absorb sulphuric acid by a regulated "drying heat causing the formation of sulphate of alumina;" the matters afterwards yield clear solutions of alumina sufficiently strong "for the crystallization of alum without evaporation." The shales in preference of the coal measures are calcined as described in N° 10,970; and while hot are immersed in vats "one-"fourth filled with sulphuric acid of sp. gr. 1·6 to 1·75," and the whole stirred and covered up with some waste material is allowed to stand four or five days, when it will be found that the mass is quite dry and the sulphuric acid "is nearly saturated with "alumina." The material is covered with "liquor at a boiling "heat from the distillation of ammonia gas liquor." From this solution alum crystallizes. The shales are further washed. Sometimes the shale after standing in the vat with the acid twelve hours is heated in a reverberatory furnace "for 8 to 10 hours" at a temperature of "from 200° to 212° F.," when it is ready for lixiviation as above.

Second, "distilling ammonia into acid mother liquors" of the above processes, and of those described in N° 10,970, "using said "heated liquors for digesting on shale and also for dissolving "out sulphate of alumina."

Third, distilling "ammoniacal gas liquor and other volatile or "partially volatile liquids by an arrangement of two or more "boilers or vessels by which the liquid to be distilled can be run "from one to the other through the whole range, and the passing "of steam charged with the volatile matter from the one to the "other through the whole range in the opposite direction." In preference the vessels are heated "all directly from a high pres-"sure steam boiler." The vapours are "passed through mother "liquors in the alum process" as before stated, or they are passed "among any of the acids to form the corresponding "ammoniacal salt."

Fourth, the use of the spent shale as above, and also that described in N° 10,970, for "the manufacture of cement or "hydraulic mortar;" also the use of spent gas lime and likewise the use of zinc or oxide of zinc for the same purpose.

Fifth, "the production of carbonate of soda and carbonate of "potash by passing solutions of hydrosulphuret of soda and "hydrosulphuret of potash through an atmosphere of carbonic "acid gas while at an elevated temperature." The sulphurets of potassium and sodium are obtained by decomposing the sulphates of potash and soda by sulphuret of barium, and it may be of strontium obtained in the usual way.

[Printed, 8*d*. Drawing. Repertory of Arts, vol. 18 (*enlarged series*), p. 24; Mechanics' Magazine, vol. 54, p. 412; Patent Journal, vol. 11, p. 84; Journal of Gas Lighting, vol. 2, p. 112.]

A.D. 1850, November 14.—N° 13,342.

SWINDELLS, JOHN.—"Certain improvements in obtaining "products from ores and other matters containing metals, and in "the preparation and application of such products for the pur-"poses of bleaching, printing, dyeing, and colour making." These are, first, obtaining copper and silver or copper only from ores; after thoroughly roasting off the sulphur the ores are digested for many hours with a solution of ammonia about 0·980° and drawn off; the silver and copper are separated by any of the usual methods, but in preference the silver is precipitated by hydrochloric acid or a chloride, and "the copper by hydrosul-"phuric acid or salts containing that acid."

Second. Extracting zinc from the native sulphuret by mixing it with about its own weight in preference of common salt, and calcining slowly until all the sulphur is converted into sulphuric acid, dissolving out the "sulphate of soda, muriate of zinc, and "muriate of iron." The sulphate of soda is obtained first, and the metallic oxides of zinc and iron are thrown down "by lime "or any other alkaline earth or substance, and afterwards smelting "the oxide of zinc in the usual way."

Third. "The process of forming chromic salts by operating on "the ores mixed with muriatic salts." The ores mixed with muriates of the salts required are exposed "to a full red or even "to a white heat" in a reverberatory furnace, "applying at the "same time a jet of steam at a very elevated temperature," stirring it every "ten or fifteen minutes until the effect required is "produced, which will be ascertained by taking a small quantity "from the furnace and testing it, as it is usual to do." The product withdrawn from the furnace is treated in the usual way in making chromic or bichromic salts. The chrome salts may consist of soda, potash, or lime, according to the chloride employed. From the chromate of lime, by the addition of soda or potash a compound salt of soda or potash and lime is formed. When chloride of sodium is employed, pure bichromate of soda is the result, and by adding to it hydrochloric acid chlorochromate of soda is produced. The remainder of the invention consists in the application of these products for the purposes given in the title.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 18 (*enlarged series*), p. 153; London Journal (*Newton's*), vol. 39 (*conjoined series*), p. 342; Mechanics' Magazine, vol. 54, p. 415; Practical Mechanics' Journal, vol. 4, p. 153; Patent Journal, vol. 11, p. 85; Journal of Gas Lighting vol. 2, p. 113.]

A.D. 1850, November 14.—N° 13,344.

LIEBHABER, Joseph Conrad Baron.—"Improvements in " blasting rocks, and in working marble and stone, and in pre- " paring products therefrom." These are, when carrying out the above objects, employing acids in various ways, &c.; in reference to this subject, it consists in preparing products from the materials used. The products are muriatic acid and sulphate of lime. " The waste material, which is muriate of lime, is introduced into " a vessel having a filter near the bottom; sulphuric acid is " added sufficient to decompose the muriate of lime; in the upper " part of the vessel is a small vessel containing muriatic acid, in " the upper of which is suspended" a basket with perforated holes " into which is placed carbonate of lime." On immersing the basket in the muriatic acid gas is generated, which passes into the vessel, and acting "upon the surface of the sulphuric acid and muriate " of lime," "forces through the filter pure muriatic acid;" by a valve at top water is admitted, "and a fresh quantity of carbonic " acid generated as before." The water with the remaining acid is forced through the filter, leaving the "sulphate of lime, which " may be removed and dried, and will then be fit for sale."

[Printed, 1*s*. Drawings. Repertory of Arts, vol. 18 (*enlarged series*), p. 15; Mechanics' Magazine, vol. 54, p. 415; Patent Journal, vol. 11, p. 184.]

A.D. 1850, December 7.—N° 13,389.

WILSON, James Thomson.—"Improvements in the manu- " facture of alum and in obtaining ammonia." These are, first, " the formation of sulphate of alumina by employing a sufficient " quantity of dilute sulphuric acid at a high temperature, and " thereby dissolving the whole available alumina of the shale " operated upon at a single operation."

Second, the use of a vessel having a false bottom "about 15 or " 18 inches from the bottom," of stout lead perforated closely with holes. The shale, disintegrated by exposure, is burnt and placed on this false bottom; strong sulphuric acid is added and afterwards water, both in certain proportions, and the whole boiled for 48 hours, and the liquor is drained from the shale.

Third, " the conversion of sulphate of alumina into alum by " adding ammonia thereto in such a state that it shall combine " with the excess of acid " obtained as above. The ammoniacal liquor obtained from gas works or other sources is employed, or vapour of ammonia is passed into the liquor until " a brown pre- " cipitate appears and does not readily re-dissolve;" if this is not enough, ammonia as sulphate must be added.

Fourth, " obtaining ammonia from the gaseous products of " coke ovens and furnaces or places other than close vessels used " for the combustion or partial combustion and distillation of " coal, by passing such gaseous matters through or in contact " with acid water capable of collecting " them. The acid is made to pass down through a hollow column filled with coke or pebbles, while the smoke, &c. passes upwards, and the acid is forced up and is re-used until it is saturated. Instead of a hollow column, an apparatus such as a wet lime purifier for gas may be employed.

[Printed, *4d.* No Drawings. Repertory of Arts, vol. 18 (*enlarged series*), p. 43; Mechanics' Magazine, vol. 54, p. 477; Patent Journal, vol. 11, p. 122; Journal of Gas Lighting, vol. 2, p. 133.]

A.D. 1850, December 20.—N° 13,424.

GOSSAGE, William Herbert.—" Improvements in the con- " centration of sulphuric acid and certain other fluids, also in " the use of a certain product sometimes obtained in manufac- " turing sulphuric acid and sulphates." These are, first, the use of apparatus which diffuses the liquid over an immense number of surfaces, and at the same time exposes it to the evaporative action of a current or currents of heated air. The liquid is placed in a vessel on the top of a tower in which pebbles of different sizes are arranged, and is made to flow very slowly down, and finally into a receiver at the bottom, whilst hot air passes upwards and out at the top charged with vapour. The air heating apparatus consists of series of iron tubes set in brick work and heated by a fire, " the flame from which ascends " between the tubes and descends between the same."

Second, the use of the material known as "burnt pyrites" for the production of sulphate of alumina, alum, and sulphate of iron, &c., as follows. To make potash alum "ground burnt pyrites," chloride of potassium, "raw pyrites containing about 35 per cent. "of sulphur" and "clay containing about 35 per cent. of "alumina," all in certain proportions, are made up into small balls with water, or in preference the mother liquor from this process, and these balls are made red hot in furnaces along with coke or coal, with drawing "portions of the burned product from "the lower part of the kilns at intervals of about six hours, and "adding four parts of oil of vitriol for each 100 parts of balls," and lixiviating with hot water, separating the copper by iron, crystallizing out the alum from the mother liquor, and obtaining protochloride of iron by crystallization. "By substituting "common salt for chloride of potassium," soda alum is the result.

If sulphate of alumina is required in place of alum, chloride of potassium is left out from the previous mixture and proceeding as before, only it is preferred to convert the iron into persulphate, and this is done best by bringing it in contact with a current of heated air as in the concentrating of acids, &c., adding lime to precipitate the peroxide of iron, separating it and any sulphate of lime, and evaporating the solution "so as to obtain solid sulphate "of alumina," or it is made into alum by adding an alkaline sulphate. When sulphate of iron and copper are required from the "burnt pyrites," its powder is mixed with raw pyrites and moistened clay, all in certain proportions and burnt, and the result treated as before, but using more acid, the copper removed by iron and the protosulphate obtained by crystallization.

Third, "the extraction of copper or salt of copper from the "material known as 'burnt pyrites' at the same time that sul-"phate of alumina" or "of iron is obtained by the use of such "material" as above.

[Printed, 1s. Drawing. Mechanics' Magazine, vol. 54 p. 517; Patent Journal, vol. 11, p. 160.]

A.D. 1851, January 21.—N° 13,465

ELLIOT, George.—"Improvements in the manufacture of "*alkali.*"

[No Specification enrolled.]

A.D. 1851, January 21.—N° 13,470

CLIFT, Samuel.—"Improvements in the manufacture of "potash, soda, and glass."

[No Specification enrolled.]

A.D. 1851, February 18.—N° 13,519.

PATTINSON, Hugh Lee.—"Improvements in the manufacture "of 'Pattinson's' oxichloride of lead."

[No Specification enrolled.]

A.D. 1851, February 24.—N° 13,529.

BELL, Isaac Lowthian.—"Improvements in the manufacture "of sulphuric acid."

[No Specification enrolled.]

A.D. 1851, March 15.—N° 13,556.

TAYLOR, Herbert.—(*A communication.*)—"Certain improve- "ments in the manufacture of carbonates and oxides of barytes "and strontia, sulphur, or sulphuric acid from the sulphates of "barytes and strontia, and for consequent improvements in the "manufacture of carbonates and oxides of soda and potassa." These are, to produce carbonate of baryta, strontia, sulphur, or sulphuric acid; the sulphate of baryta or strontia are reduced to sulphurets by calcining with carbonaceous matter or by "ex- "posure to an incandescent current of carbonic oxide," and a solution of the sulphuret is saturated with carbonic acid in close vessels; carbonate of barytes precipitates, "sulphuretted hydrogen "evolves," and is ignited with only sufficient air to convert its hydrogen into water, or it "is brought into contact with nitrous "vapours and an excess of atmospheric air; in both of which "methods sulphur will be set free." Sulphuric acid is made by igniting the sulphuretted hydrogen, conveying the vapours into acid chambers and treating them in the usual way. "To obtain the "oxides of baryta and strontia the carbonates of these bases are "subjected to an intense heat." Or the solution of the sulphuret by exposure, evaporation, &c. may be converted into sulphur, and the hydrate is converted into carbonate by exposing the crystals of this salt or a solution to carbonic acid. Carbonates of potash and soda are *made by bringing* solutions of the sulphates of potash and soda into contact with carbonate of barytes or strontia. The hydrates of baryta and strontia substituted for the carbonates as above, " caustic potash or soda are in solution."

[Printed, 4*d*. No Drawings. Mechanics' Magazine, vol. 55, p. 256; Patent Journal, vol. 11, p. 294.]

A.D. 1851, April 15.—N° 13,593.

BARLOW, Thomas Greaves, and **GORE, Samuel**.—" Improvements in the treatment of certain substances used in the " production of gas for giving light and heat, and of some of " the products of the said substances; as also in the apparatus " employed in the manufacture of such gas, and in discharging " and giving motion to gas." These are, in reference to this subject, first, in place " of passing the mixture of hydrogen, car- " bonic oxide, and carbonic acid," obtained by decomposing steam or water, coke and coal, after the condensation of the steam, through a second retort containing the residue of the first distillation; " the carbonic acid gas may be separated before their intro- " duction into the carbonizing retort, by passing them through " lime, carbonate of soda, protoborate of soda, or other substance " capable of absorbing carbonic acid." " The lime may after- " wards be deprived of its carbonic acid by calcining it, and may " then be used over again. The carbonate of soda and protobo- " rate of soda, after becoming saturated with carbonic acid, may be " rendered again fit for absorbing carbonic acid by simply boiling " their solutions, which will expel the carbonic acid or a portion " of it."

Second. Treating the residue of some coals, " particularly that " description of coal known as boghead cannel coal, after having " been distilled and exposed to the action of steam in retorts," in obtaining gas, as follows:—The ash is introduced into a pan or boiler and heated with dilute sulphuric acid so as to form a solution of sulphate of alumina. The boiler employed " for this pur- " pose has a vertical partition perforated with holes, which divides " it into two compartments; the ash of the boghead cannel coal " is placed in one compartment, and heat is applied under the " other compartment. The acid liquor is thus caused to circulate " through the ash, extracting the alumina from it, while the un- " dissolved silica contained in the ash remains in the compartment " not exposed to the direct heat of the fire." " The sulphate of " alumina thus obtained is mixed with solution of potash or

" ammonia, and the alum crystallized in the ordinary manner. " Sulphate of ammonia obtained in the manufacture of gas may " be used for this purpose." The residue of the boghead coal, when steam has not been used in the making of gas, is to be used as fuel for heating the pans or boilers, and when it is reduced to a state of ash it is placed in the pans or boilers and treated as above with dilute sulphuric acid; the residue is "silica in a finely " divided and nearly pure state, suitable for being used with " advantage in the manufacture of pottery, porcelain, and glass, " and which, from its finely divided state, may be used as a " dentifrice and as a polishing powder." The residue of the boghead cannal coal after distilling in retorts without previously removing the carbonaceous matter by combustion or by treatment with steam, after the extraction of the alumina, leaves a porous carbonaceous residue, "which may be advantageously used as a " decolorant in a similar manner to that in which animal charcoal " is now employed." The remainder of the Specification relates to the other matters contained in the title.

[Printed, 1s. 8d. Drawings. Mechanics' Magazine, vol. 55, p. 352; Patent Journal, vol. 12, pp. 73 and 96; Journal of Gas Lighting, vol. 2, p. 207.]

A.D. 1851, May 3.—N° 13,620.

COOKE, WILLIAM.—(*A communication.*)—" Improvements in " the manufacture of soda and the carbonate thereof." These are, obtaining " caustic soda and carbonate of soda (soda ash) " as follows:—A large tank is divided into three compartments by means of two porous diaphragms; two copper plates are in the middle compartment, and large pieces of iron, all connected together by a clean surface, are in each of the two other compartments, each copper plate is connected by a slip of copper "with " the next mass of iron;" a solution of common salt is put into each compartment with the iron, and clean water in the compartment with the copper. The vessel is covered up and " the tem" perature being now kept above 70° F., the decomposition of the " salt will be accomplished within seven days." The soda is in the middle compartment in solution, and the liquid may be evaporated from it. " The caustic soda when dry must be kept " hot and stirred for an hour or two, during which time it will ab" sorb the carbonic acid from the atmosphere with great avidity;

" it will greatly increase in bulk, and will be finally converted " into pure carbonate."

[Printed, 4*d*. No Drawings. Mechanics' Magazine, vol. 55, p. 396; Patent Journal, vol. 12, p. 61. Rolls Chapel.]

A.D. 1851, May 10.—N° 13,630.

LONGMAID, William.—" Improvements in treating ores and " minerals, and in obtaining various products therefrom, certain " parts of which improvements are applicable to the manufac- " ture of alkali." These are, in reference to this subject, first, " In using coke in the decomposition of common salt and ores " and minerals containing sulphur," in preference " having the " fire-place of the furnace closed with a door, and the ash-pit " supplied with water." In using anthracite mixing with it about " one-sixth part bituminous coal." The opening of the fire-place is fitted with an iron plate over which an arch is turned; on this the coal is partially coked, and when it is so the fire is replenished with it and a further quantity of coal is placed on the plate. The ash pit is supplied with water.

Second. The ores containing silver and copper and sulphur are treated as described in N° 9496. " If the minerals contain a con- " siderable quantity of arsenic, antimony, or zinc, or any of them " in preference they are calcined and the calcined material mixed with ore rich in sulphur when the " principle objects is to obtain " sulphate of soda." To ores rich in sulphur, in place of calcined ores adding oxide of iron. A solution of the calcined mass flows through vessels furnished with metallic copper, the silver is precipitated, and iron is employed to precipitate the copper. The sulphate of soda is converted into carbonate.

Third. To convert the sulphide of copper into sulphate the ore is roasted with access of air, silver is precipitated from the solution by copper and the salt of copper crystallized.

Fourth, precipitating " silver and copper from these solutions " " by means of sulphite of calcium such as alkali waste." Also by means of the substance described under the third head of N° 11,931, also black ash or crude alkali. The liquors are filtered through layers of these substances on straw. " The silver and " copper during the operation combine with the sulphur " and " *chlorine or* acid as the case may be."

Fifth, heating diluted solutions "by preference to boiling;" "the silver is precipitated in the state of the chloride."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 18 (*enlarged series*), p. 381; Mechanics' Magazine, vol. 55, p. 416; Patent Journal, vol. 12, p. 72.]

A.D. 1851, June 24.—Nº 13,676.

FIRMIN, GEORGE JORDAN.—"Improvements in the manufacture of oxalate of potash."

These are, manufacturing "oxalate of potash by employing "oxalic acid and water to act on a salt of potash;" tartrate of potash is preferred. "After saturating the excess of acid contained in cream of tartar by carbonate of lime," the supernatant liquor is run off into a vessel, and "having ascertained the "quantity of tartrate of potash," "add for every 100 pounds of "neutral tartrate of potash about 60 lbs. crystallized oxalic acid "previously dissolved"; neutral oxalate of potash is in solution while acid tartrate of potash is precipitated. The superoxalate of potash is made by adding to the oxalate as much oxalic acid as was previously added, and evaporating to crystallization. Sulphate of potash and muriate of potash may be employed; the quantities and temperatures to be employed are given.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 19 (*enlarged series*), p. 102; London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 252; Mechanics' Magazine, vol. 56, p. 16.]

A.D. 1851, July 17.—Nº 13,695.

ALBRIGHT, ARTHUR.—(*A communication from Professor Anton Schrotter.*)—"Improvements in the manufacture of phosphorus "and in the apparatus to be used therein." These are, producing amorphous phosphorus as follows:—A cast-iron boiler-shaped vessel is set in brick work; a smaller vessel is fitted inside of this; between the two vessels is a metallic bath composed of a mixture of tin and lead in equal parts; a dome-shaped cover fits over this inner vessel; within this inner vessel is again a third iron vessel, the space between these two last vessels being occupied with sand; in the interior of this last vessel is another vessel of glass or porcelain, in which the phosphorous to be operated upon is placed; over this iron vessel is a cover which is secured by a screw passing down the centre of a three armed holder, between the end of which screw and the cover is a small strong concave disc or spring of steel, so as to give a slight play to the cover. A curved pipe of iron or copper *passing freely* through the before-mentioned dome-shaped cover is screwed tightly into the cover of the inner vessel, and having an exit into a detached vessel containing mercury or water, if the first is employed it is as well to cover it with water. Above the mercury or water is a tap on the pipe, and a spirit lamp to heat the pipe if stopped. The phosphorous to be converted is melted, cooled under water, dried as much as possible, deposited in the inner vessel, and the covers adjusted. A fire is made under the outer vessel and the heat gradually raised until bubbles escape at the end of the pipe, which take fire as they enter the air; when these bubbles have escaped for some time the temperature is raised to 500° F. and kept at that point a certain time, "the length of " which depends so much upon accompanying circumstances that " it can only be determined by experience."

It may be desirable to increase the pressure on the vessel containing the phosphorous, and for this purpose the mercury should be deepened in the detached vessel. So soon as the phosphorous is converted into an amorphous state the tap is shut on the pipe above the mercury, and the vessel is allowed to cool down. The phosphorous is then taken out and "levigated under water, from " which it may be drained by being placed in a bag or on a filter," and while still moist spread thinly on shallow trays of sheet iron or lead, which are capable of being heated by some bath or by steam, the heat being applied gradually, and the phosphorous stirred until in the dark no luminous vapours are observed, water being at hand to quench any fire that might arise. When the process of purification is thus far completed the phosphorous must be washed until the water shews no trace of acid." "In case the " amorphous phosphorous produced contains too large a propor- " tion of the unconverted phosphorous then bisulphuret of carbon " or other solvents may be employed to wash out the ordinary " phosphorous."

[Printed, 1*s*. Drawing. London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 278; Mechanics' Magazine, vol. 56, p. 78.]

A.D. 1851, August 7.—N° 13,714.

NORMANDY, Alphonse Rene Le Mire de, and FELL, Richard.—" Improved methods of obtaining fresh water from " salt water, and of concentrating sulphuric acid."

The concentrating sulphuric acid alone belongs to this subject, and consists in introducing the acid to be concentrated into a chamber by means of a platinum funnel and tube, in which it flows over a series of shelves before it arrives at the bottom, where it leaves the apparatus by a tube. The vessel is heated, and "a "portion of the water which the acid contains evaporates and "distils over" through a tube in the side near the top.

[Printed, 1*s*. Drawings. Repertory of Arts, vol. 19 (*enlarged series*), p. 158; Mechanics' Magazine, vol. 56, p. 156; Artizan, vol. 10, p. 65.]

A.D. 1851, September 18.—N° 13,749.

LEAKE, John Simpson.—"Certain improvements in the pro-"cesses and machinery or apparatus employed in the manufac-"ture of salt." These are, "the passing of the materials over the "top of the pans by means of wheeled or other trucks, or hurdles "running on rales for that purpose placed between the pans," and "having perforations in the floors or bottoms thereof, through "which part of the brine is returned in a state of hot solution "into the pans, while the remainder, or all that attains during "each traverse of the hurdle the concentrated state, *i.e.*, the salt, "is carried forward and discharged into the warehouse, boats, or "trucks."

[Printed, 10*d*. Drawing. Mechanics' Magazine, vol. 56, p. 253.]

A.D. 1851, September 25.—N° 13,755.

WATT, Charles.—"Improvements in the decomposition of "saline and other substances, and in separating their component "parts or some of them from each other; also in the forming of "certain compounds or combinations of substances; and also in "the separating of metals from each other, and in freeing them "from impurities." These are, in reference to this subject, first, "decomposing by the agency of electricity saline or other sub-"stances in solution by means of a vessel divided into two or "more compartments separated from each other by partitions of "porous materials." Each of the compartments is filled with a strong solution of the salt to be decomposed; the vessel is fitted with electrodes, "moveable heads for collecting and conveying "the gases generated," &c. "Contact is now made between the "sources of the electric current or currents" (a Daniel's constant battery of six cells) "and the proper attachments of the "vessel, so as to complete the electric circuit." When decomposition sets in, if a chloride is in the compartment chlorine gas is evolved, the vessel is kept up to "a temperature of not less than "120° F.;" the strength of the solutions is maintained by adding "from time to time fresh portions of salt of the same kind as "that being decomposed." If chlorides of potassium are acted "upon, caustic potash and soda are produced. To prepare the "carbonates of these alkalies a current of carbonic acid gas is "passed into the compartments which contain "the eleminated "alkali." The salts from these solutions are obtained in the usual way. If a nitrate or sulphate is decomposed the acids are separated from the residues by distillation, &c., when the chief object is to obtain "the alkaline base of a salt," sometimes introducing "a pole or electrode made of zinc, iron, or other metal," into the compartment where the chlorine or acid is evolved. "The metallic salts thus obtained" are eleminated by the known means. When zinc is employed as an electrode in the decomposition of nitrate of soda, the alkali is "in one compartment and "nitrate of zinc in the other." The nitrate of soda left undecomposed may be separated from the nitrate of zinc by "crystallization, or it may be decomposed by lime or its carbonate," and the nitrate of lime prepared "for commerce; or the nitrate of "lime may be decomposed with sulphate or carbonate of potassa, "by which nitrate of potassa will be formed." "Instead of "using lime," using "baryta, strontia, magnesia, ammonia, or "their carbonates, either for the preparation of the nitrates of "those bases or for the subsequent production of nitrate of "potassa." "To prepare chlorine gas" operating upon hydrochloric acid, or "chloride of potassium and diluted sulphuric "acid," hydrogen is evolved in one of the compartments, and may be conveyed away and "used as a source of heat," &c. When a nitrate or sulphate is employed without an electrode, oxygen gas is evolved, and may be collected, "and it may be "used for the preparation of carbonic acid."

Second, converting chlorides of the alkalies and alkaline earths into hypochlorites and chlorates of these bases. Two electrodes are placed in a vessel with a steam jacket "over each other," the lower one being intended for the elimination of the chlorine, and the upper one for the elimination of the alkali. A warm solution of the chloride, to which has been added "a portion of free alkali "or alkaline earth," is placed in the vessel, and the connections with the battery made. If it is desired "to produce a hypochlorite," the vessel is kept warm, say from 100° to 120° F. If a chlorate is required, the temperature is raised and continued. Hydrogen gas is evolved from the decomposition of the water, and is collected in a separate vessel. "This mode of forming "hypochlorites" "may be used for preparing a bath" for bleaching purposes.

[Printed, 8*d*. Drawing. Repertory of Arts, vol. 19 (*enlarged series*), p. 301; Mechanics' Magazine, vol. 56, p. 277.]

A.D. 1851, November 4.—N° 13,800.

VIVIAN, Henry Hussey.—(*A communication.*)—"Improve-"ments in obtaining nickel and cobalt." These are, in reference to this subject, obtaining "the arsenurets of nickel and cobalt in a "marketable state," as follows:—In adding to "ores, slags, and "other compounds containing copper and other metals, the whole "or chief part of which are in an oxidized state," "such propor-"tions of sulphur in whatever form used" as "will convert the "copper into a regulus of between fifty and sixty-five per cent., "having a character between those known as 'red metal' and "'sparkle metal,' and such proportions of arsenic in whatever "form used as will prevent the bottom from assuming a coppery "appearance, converting it entirely into a compound, which when "broken will have a sharp bright white fracture." Carbonaceous matter, as coal, is also added "for the more complete reduction of "the oxides." This mixture is melted and tapped into a bed, the arsenical portion sinks to the bottom of the pigs and is separated when cool. Copper ores and regulus containing small quantities of nickel and cobalt are smelted until they arrive at what is known as "white metal." This white metal is roasted "in the same way "as would be done for the purpose of producing a metallic "bottom." On the completion of the first portion of the roasting process with the plug holes closed, and prior to melting for tapping, adding arsenical pyrites in certain proportions. On tapping the furnace into the beds the metallic bottom will be found to be a low arsenical compound of nickel and cobalt.

Copper ores or regulus containing large quantities of nickel and cobalt non-oxidized; in these ores there will generally be found a large portion of arsenic present. These ores are melted in the usual manner, and instead of running the metal into water they are run into pigs. At the bottom of one or more of the first pigs is a regulus of a light white fracture easily broken from the copper regulus, and is "an arsenical combination of copper, nickel, "cobalt, and other matters."

To separate nickel and cobalt from cupreous alloys they are granulated and mixed with sulphur and arsenic and melted and run into pigs, and the arsenical compounds separated as above.

To obtain "the arsenurets of nickel and cobalt in a marketable "form," the products obtained as above contain "nickel and "cobalt in proportion varying usually from 1 to 12 per cent.;" they are "pulverized or granulated and then calcined," and the material afterwards melted with the addition of sulphur, silica, and arsenic, or arsenical pyrites, sufficient to absorb the whole of nickel and cobalt, together with portions of the other metals. If sulphate of barytes or other sulphate is used in place of sulphur, "coal or "other carbonaceous matter must be added." The slag is skimmed off and the arsenical products tapped, "and these separate in cooling by their respective specific gravities," and this melting and tapping is repeated several times until the arsenical product is freed from its impurities, and there is obtained "an "arsenuret of nickel and cobalt of the required purity."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 19 (*enlarged series*), p. 346; Mechanics' Magazine, vol. 56, p. 378.]

A.D. 1852, January 20.—N° 13,904.

LOWE, George, and EVANS, Frederick John.—"Improve"ments in the manufacture of gas for the purposes of illumina"tion, and of improvements in the purification of gas." The first improvements relate to the manufacturs of gas. The improvements in reference to this subject are, first, heating "together "peroxide of iron and caustic potash or soda to a dull red heat, "by which a kind of ferrate or ferrite of potash or soda is pro"duced," which when washed with water, caustic potash, or soda is in solution, and peroxide of iron precipitated in the state fit for the purification of gas. "The solution of potash or soda "when evaporated to dryness may be again and again employed "upon fresh portions of peroxide of iron." Again the peroxide of iron is treated in a similar way only less caustic potash is used, and this is mixed with common salt, and these, the potash and chloride of sodium, are recovered and used over and over again; or the common hydrated peroxide of iron is heated to about 600° F.; or native ochres are heated with the same precautions. These oxides become sulphurets on exposure to gas and revive in air. And the claim is “ for the use of anhydrous peroxide of iron “ prepared as above ” in purifying gas.

Second. “The use of the sulphite and bisulphite of lead for “ the removal of the sulphuretted hydrogen of coal gas.” These substances are employed singly or together in a wet lime purifier, and when they cease to purify the material is filtered, dried, and burned “ so as to make sulphurous acid, which is employed in the “ manufacture of fresh sulphite or bisulphite of lead, as the case “ may be, or in the production of sulphuric acid, as is well known “ to chemists.” The matter which remains after burning is roasted, and thus converted into oxide of lead or litharge, from which sulphite or bisulphite of lead may be again produced.

[Printed, 6*d*. Drawing. London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 248; Mechanics' Magazine, vol. 57, p. 78; Engineers' and Architects' Journal, vol. 15, p. 392; Journal of Gas Lighting, vol. 2, p. 394.]

A.D. 1852, January 20.—N° 13,904.*

LOWE, George, and EVANS, Frederick John.—“Im“ provements in the manufacture of gas for the purposes of illu“ mination, and of improvements in the purification of gas, and “ of improved modes of treating the products arising from the “ manufacture of gas.” By a disclaimer and memorandum of alteration, enrolled the 20th day of July 1852, the following words are struck out of the title, “and of improved modes of treating “ the products arising from the manufacture of gas,” whereby the said title will be made to read as follows:—“ Improvements “ in the manufacture of gas for the purposes of illumination, and “ of the improvements in the purification of gas.”

[Printed, 4*d*. No. Drawings.]

A.D. 1852, January 23.—N° 13,909.

RICHARDSON, Thomas.—“ Improvements in the manufacture “ and preparation of magnesia and some of its salts.” These are, first, “ the mode of making magnesia.” Magnesian limestone, by analysis containing “ the largest proportion of mag“ esia,” is calcined, slaked, agitated with dilute hydrochloric acid containing rather more than the equivalent quantity required to dissolve out the lime, and the residue washed with water; the residue is impure magnesia. The acid in preference used is “ the “ weak acid such as is now permitted to run waste.” In place of the calcined stone being used, “ new magnesian limestone,” in preference ground, is employed and treated in the same manner; " the residual impure carbonate of magnesia may either be used in " that state" or is calcined to drive off carbonic acid.

Second, " manufacturing salts of magnesia" as follows:— " Pure sulphate of magnesia" is made by dissolving the above magnesia in " rather less sulphuric acid than is necessary." " Rough epsoms" are made by partially neutralizing " the excess " of sulphuric acid" in the " mothers" of the alum making by the above magnesia.

Applying the above magnesia by adding it to sulphate of alumina solutions " nearly to neutralize the excess of acid," then adding the alkali, crystallizing out the alum," the sulphate of magnesia, either liquid or crystallized, is then obtained as a residue.

In " purifying rough epsoms or liquids," adding to them the above magnesia in place of washed " calcined magnesia lime-" stone," as it is said is done in N° 12,944, adding with the cream of magnesia " a very small quantity of animal or vegetable " charcoal." " Purifying rough epsoms" by calcining them as before with the above magnesia.

Sulphate of iron solutions from the slow oxidation of iron pyrites are treated with an excess of magnesia prepared as above, and the solution on evaporation yields pure sulphate of magnesia.

" Employing carbonate of magnesia obtained by treating " magnesian limestone with muriatic acid in place of native " carbonates of lime" in making sulphate of magnesia and carbonate of soda by the process described in N° 11,279. Carbonate of magnesia of commerce is made by passing streams of carbonic acid through " a series of Woulfe's bottles" containing magnesia and water, the " consistence of milk," until a clear solution results. This solution gently heated yields the salt. Chloride of magnesia is made by saturating the magnesia made as above and dried with chlorine gas.

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 20 (*enlarged series*), p. 180; Mechanics' Magazine, vol. 57, p. 113.]

A.D. 1852, January, 24.—N° 13,912.

HILLS, Frank Clarke.—" Improvements in manufacturing " and purifying certain gases and in preparing certain substances " for purifying the same." These are, in reference to this subject, first, " a method of burning carbonate of lime formed in purify-

" ing gas by lime, so that it may be re-used for the purification " of gas." "The bed of the furnace is formed in two stages, the " hinder one being higher than the fore one. These beds are com" posed of fire tiles or bricks. The fire is situated under the " fore bed and is fed from the sides; and the flame and heated " air, after circulating under the fore bed, pass off at the opposite " side, and sweep first over the fore bed, and than over the hinder " bed, from whence they descend and pass under the hinder bed " in their passage to the chimney." The carbonate of lime, &c. is first placed on the upper bed, then discharged on to the lower bed, " where being heated above and below a sharp red heat the " carbonic acid is quickly dispelled." "Carbonate of magnesia " will of course part with its carbonic acid by this treatment more " readily than lime."

Second. When "oxides of iron are no longer capable of being " readily renovated by air, and are become useless for purifying " gas," they may be treated as follows, and are available for purification:—The sulphur and other impurities having been burnt off or otherwise got rid of, the remaining oxides of iron are mixed with soda, potash, or their carbonates or nitrates in a strong solution, "two of oxide and one of caustic answers well." This mixture is made nearly red hot, and in preference is used in the first purifier until it will take up no more cyanogen, when it is " taken out of the purifier, and the cyanogen compounds may " be washed out for use." Instead of heating the spent oxides with the alkalies, the alkalies "may be mixed with fresh oxides, " or the soluble salts of iron," and placed in a purifier, and when the mixture ceases to take up cyanogen and sulphur it is to be taken out for renovation, and may be made damp by a solution of the alkalies immediately after taiking out of the purifiers. After renovation the mixture is again "put into the purifier to " take up more cyanogen, and this process may be repeated until " the material can no longer be profitably used, after which the " compounds of cyanogen may be washed out for use." "Another " method of rendering spent oxides" which have not been mixed " with alkalies" fit for re-use is to wash them with a weak solution of alkali, prefering carbonates of potash or soda, " so as to " obtain the cyanogen compounds for use," then burning off the sulphur from the oxides; or the sulphur is "got rid of in any " convenient way, and the oxide will be fit for re-use as before " described." "Instead of mixing any material such as sawdust,

" breeze, &c. with the said oxides, &c." it is preferred to granulate them; some of the oxides are granulated by making into cakes with water, drying the cakes " in the sun or at a moderate " heat " and breaking them into the required size; " the dust is " separated by sieves and may be mixed up again." The oxides may be made granular by moistening them and stamping in a press, which by percussion will make them into a solid state. " The oxides which are burnt or heated with the alkalis may be " made granular in the furnace by the action of heat." The other processes in this Specification refer to the manufacture of gas.

[Printed, 6*d*. No Drawings. Mechanics' Magazine, vol. 57, p. 97; Journal of Gas Lighting, vol. 2, p. 416.]

A.D. 1852, February 3.—N° 13,956.

CLAUSSEN, PETER.—" Improvements in the manufacture of " saline and metallic compounds." These are, first, oxidating liquid ammonia by allowing it " to drop on to the oxidating sur- " face of the spongy platinum, pumicestone," &c., and " then " again into a solution of the base of the future nitrate."

Second, the formation of caustic and carbonate of soda " by " the double or simple decomposition of sulphate of soda or " of chloride of sodium." " Hydrates of lime, baryta, or of " strontia" decompose sulphate of soda, precipitating as sulphates; hydrate of soda is in solution; by long exposure of this solution to the air the " soda will become a carbonate, and may be " crystallized." " Common salt" is " decomposed" " by means " of certain organic acids, which are afterwards decomposed by " heat," by " gaseous acids," " by hydrates, oxides, peroxides, " and certain metallic bases; also by certain carbonates, carbonate " of ammonia excepted."

[Printed, 4*d*. No Drawings. London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 353; Mechanics' Magazine, vol. 57, p. 139; Engineers' and Architects' Journal, vol. 15, p. 427.]

A.D. 1852, February 23.—N° 13,974.

NEWTON, WILLIAM EDWARD.—" Improvements in the manu- " facture of coke, and in the application of the gaseous products " arising therefrom to useful purposes." These are, " the adapta- " tion to ordinary coke ovens of an apparatus whereby the gaseous " products evolved during the combustion of coal " may, " without

“ interfering with the ordinary process of cooking, be drawn off “ and conveyed away to a receptacle or chamber where they may “ be separated from each other and combined with other chemical “ agents to form valuable products, or used for some other useful “ purposes.” The gases from the coke ovens enter a horizontal chimney or flue, which leads them into a chamber of brickwork or masonry, having a refrigerator (a coiled pipe) near the bottom; the chamber is partitioned off so that the gas entering at the top descends nearly to the bottom, ascends nearly to the top, and and descends again, when it passes out into a vessel made of stone or lead, under a false bottom pierced with holes, and piled up to the top with pieces of coke, pumice, &c.; diluted acid placed in a vessel above is allowed to flow in a shower through a pipe on to the pieces of coke, pumice, &c.; and “ will meet in its “ passage with the gases which are made to pass ” through “ the “ vessel in a contrary direction.” The gases uncombined with the acid are drawn through a pipe by a “ centrifugal or other ventilator for increasing the draft.” The acid descending absorbs the ammonia and “ will arrive in a saturated state in the lower “ part of the vessel. The solution flows into a leaden vessel “ below, and ultimately into concentrating vessels. The gases are conducted under a “ concentrating boiler or evaporating vessels, and employed as fuel for heating and concentrating the “ liquid salts of ammonia which have been produced.”

[Printed, 1*s*. 8*d*. Drawings. London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 413; Mechanics' Magazine, vol. 57, p. 198.]

A.D. 1852, February 23.—N° 13,987.

BOULTON, SAMUEL.—“ Improvements in the treatment of “ metallic ores, and certain salts and residuary matters, and in “ obtaining products therefrom.” These are, first, manufacturing “ zinc and its oxide, and also chloride of zinc, from sulphate of “ zinc”; this is done by dissolving the sulphate “ along with any “ salt containing chlorine or muriatic acid.” If an insoluble sulphate is formed, the solution of chloride of zinc is drained off. If a soluble sulphate, as of potash or soda, when the chloride of these bases is employed, the sulphate is crystallized out. The chloride thus obtained is converted “ into oxide of zinc or metallic “ zinc by any of the ordinary methods.”

Second, the manufacture of zinc and its oxide from chloride of “ zinc obtained by sublimation ” as follows:—The ore is mixed with common salt in "atomic proportions," and calcined either without or with "a steam or blast of atmospheric air;" the chloride of zinc sublimes and is condensed in the ordinary way. When the zinc ore is carbonate, carbonate of the alkali used is produced. The chloride is converted into oxide or metal "in the common "way."

Third, manufacturing potash and soda and their carbonates as above.

Fourth, the decomposition of sulphates of soda and of potash by "the application of hydrogen gas alone" or "of any gas con-"taining hydrogen." The sulphate is reduced to sulphide by carbonaceous matters, alone or mixed with lime, &c., and heat, or the sulphate alone or mixed with the carbonaceous matters, &c., by "hydrogen gas, or any gas containing hydrogen." Sulphur is expelled from sulphides by steam, or by applying to the mass the above gases in a close furnace.

Fifth, making "sulphur or sulphuric acid by operating upon "sulphates or sulphides," &c., as above.

[Printed, 4*d*. No Drawings. Mechanics' Magazine, vol. 57, p. 179.]

A.D. 1852, March 8.—N° 13,999.

GRAHAM, James.—"Improvements in treating ores containing "zinc and the products obtained therefrom." These are, first, "roasting or calcining that zinc ore which is called blende in close "vessels or furnaces, so as to obtain sulphuric acid during the "process of such treatment in the manufacture of oxide of zinc." "This process may be conducted in furnaces similar to those in "which iron pyrites are burned for the same purpose," but preferring a mode of arrangement as follows:—

Second, "the mode of arranging the pots or retorts, the oxi-"dizing chamber, and the holes for keeping the pipes clear, and "the mode of preventing explosion of the gases in the manufac-"ture of oxide of zinc from blende and calamine;" five pots are described standing in a furnace, horizontal pipes from these lead into the oxidizing chamber in communication with the receiving chamber for the oxide, but shut off from it by a valve or door during the escape of gases, and "until the metallic vapours "appear,"; above these pipes is an upright pipe to carry off the gases, at the top of which is a valve, lid, or door, through which they are evolved; this also serves to keep the pipe clear; opposite the horizontal pipes are "round holes or pipes built in the oxi- "dizing chamber," which answer the double purpose of keeping the pipes clear and also "admit sufficient air to gorge the gases, "preventing explosion;" there are also valves in the top of the condensing chamber "in case of an accidental explosion."

Third, "Roasting or calcining that zinc" ore "called calamine" as above, so as to "obtain carbonic acid" during such treatment.

[Printed, 10*d.* Drawings. Repertory of Arts vol. 20 (*enlarged series*), p. 351; Mechanics' Magazine, vol. 57, p. 238.]

A.D. 1852, March 24.—N° 14,039.

BELL, Thomas.—"Improvements in the manufacture of sul- "phuric acid."

[No Specification enrolled.]

A.D. 1852, April 6.—N° 14,056.

PATTINSON, William Watson.—"Improvements in the "manufacture of chlorine." These are "surrounding a stone or "earthen still or vessel with coal tar or other suitable substance" "when used for the manufacture of chlorine" for the purpose of preventing the escape of gas, &c., should the stone retort or vessel break when steam is forced among the materials as in N° 11,290. A case is provided, consisting of an external and internal iron vessel, the inner vessel being perforated with a number of holes; into this the stone vessel is placed and fixed by cement, &c. Above this is fixed a tall cistern filled with tar communicating with the space between the external and internal iron vessels; through this cistern passes a lead pipe, which "is continued and "coiled quite round the inner iron pan in the space between it "and the outer one, two or three times." On beginning to work heated coal tar, previously thickened, fills the space between the iron vessels. The steam, instead of being used as formerly at 10 pounds, is at a much higher pressure. Other substances may be substituted for the tar, as gutta percha, &c. &c.

[Printed, 6*d.* Drawing. Repertory of Arts, vol. 20 (*enlarged series*), p. 301; Mechanics' Magazine, vol. 57, p. 334.]

A.D. 1852, April 28.—N° 14,093.

RICHARDSON, Thomas.—"Improvements in treating matters "containing lead, tin, antimony, zinc, or silver, and in obtaining "such metals or products thereof." These are, first, in softening the hard leads of commerce by heating them in the open air a quantity of metallic oxide is formed, consisting of oxide of lead and variable quantities of oxide of antimony or tin. This mixed oxide is employed as afterwards stated, or the waste alloys of copper or tin are exposed to a current of hot air in a reverberatory furnace "until they are converted into oxides of the "metals." These mixed oxides are employed in place of litharge with acetic or nitric acid, as in making acetate or nitrate of lead, which dissolves out the oxide of lead, leaving "the oxide of tin "or antimony, which may then be reduced to the metallic state" by any methods now practised. If the mixed metals have been tin and copper, their mixed oxides are employed in place of "oxide "of copper with acetic or sulphuric acid for the manufacture of "acetate or sulphate of copper;" the oxide of tin left may be reduced as already explained, or employed "in the place of the "metal or ore for the production of tin or stannate of soda by "any of the methods now in use."

Second. "Reducing the mixed oxides of lead and antimony "already named, in an ordinary reverberatory furnace, along with "common alkali and carbon," and again submitting to calcination in an iron pan, holding about ten tons of the metal, the mixed "metal," the oxide which is formed during the process, contains a "much larger quantity of antimony than the previous one, while "nearly all the silver remains in the soft lead. This mixed oxide of "antimony and lead is ground and lixiviated in the usual manner, "and subjected to the action of hot air in an ordinary red lead "furnace" "until the lead has been converted into the red oxide. "This product is again lixiviated and dried. In this state it may "be used as a pigment, or substituted for red lead in the manufacture of flint or other kinds of glass."

Third. "Preparing the sulphuret of lead for reduction." The process lasts from thirty hours to three, four, or five days, according to the nature of the ore. The operation is conducted at a dull red heat, until the whole or nearly the whole of the sulphur is expelled. The ore is never heated, so that it becomes pasty, and the furnace has five or six flats. "The ore is charged on the "flat farthest from the fire, and gradually removed as the roasting proceeds to that nearest the fire bridge."

The last process, and which does not come under this subject, is for "smelting certain matters containing silver and lead "in a furnace of a peculiar construction."

[Printed, 10*d.* Drawing. Repertory of Arts, vol. 20 (*enlarged series*), p. 357; Mechanics' Magazine, vol. 57, p. 393.]

A.D. 1852, May 8.—N° 14,119.

TIZARD, WILLIAM LITTELL.—" Improvements in machinery " apparatus and processes for the preparation of grain and for its " conversion into malt, saccharine, vinous, alcoholic, and acetous " liquors." These are, in reference to this subject, first, " the " treatment of saccharine, vinous, and acetous liquors by causing " them to pass through a filtering operation " either in a hot or cold state. The apparatus employed consists of " a closed vessel " with a coil of steam pipe traversing its interior," called " the " warmer," " a force pump," and " an iron or copper cylinder of " any required dimensions fitted with a cylindrical filter composed " of silicious or other permeable materials," preferring such filters " made by Messrs. Ransome and Parsons of Ipswich, of such " diameter that sufficient space shall be left between the exterior " thereof and the interior of the cylinder to admit a brush or " scraper." " The cylindrical filter has a hollow perforated axle " passing longitudinally through it, and in stuffing boxes in the " ends of the outer cylinder; one end of this axle is closed and " the other end left open." " The closed end of the axle of " the filter is attached to any suitable driving gear, and the " open end is connected to the ingress pipe of a refrigerator." The " enclosing cylinder is furnished with a safety valve on the " upper side and a yeast sluice or tap on the lower side." The suction pipe of the force pump is connected to the bottom of the " warmer " and its delivery pipe communicates with the interior of the iron cylinder.

Second, manufacturing " vinegar and acetic acid from malt and saccharine liquors " by applying " heated air under pressure " injected into the wash or liquor from which the vinegar or acetic " acid is to be produced for the purpose of faciliating the acetous " fermentation or oxidation of the same."

Third, " the mode of condensing the volatile and condensible " portions of the liquors evaporated during the process, and re- " turning them to the vat " during the above operation. On the head of the vessel is a condensing worm, the lower end of which enters the vessel.

[Printed, 4*s*. 2*d*. Drawings. Mechanics' Magazine, vol. 57, pp. 427 and 461; also vol. 58, p. 141.]

A.D. 1852, May 29.—N° 14,147.

LOSH, WILLIAM SEPTIMUS.—" Improvements in the purifica- " tion of coal gas." These are, first, " the application of chloride

" of lead to the purpose of purifying coal gas," also obtaining the soluble salts or compounds formed by the action of chloride of lead upon coal gas. " Chloride of lead in powder is mixed " with about an equal bulk of coke in coarse powder, from which " the dust has been removed by a sieve, or with sawdust. One " or other of these mixtures, when damped, is charged upon the " shelves of an ordinary gas dry lime purifier. When the chloride " of lead ceases to act upon the gas, the gas is passed through " another purifyer similarly charged. The saturated chloride of " lead is washed with water, so as to obtain compounds of " ammonia, sulphur, &c.;" these solutions " are afterwards " evaporated to dryness, or otherwise made use of; the lead compound and coke or sawdust remaining," are " now separated " by means of a brake sieve, such as is used in washing lead ore."

Second. " Reconverting the lead into chloride of lead, so as " again to be employed in the purification of coal gas." " The " lead compound above, having passed through the sieve," is " treated with hydrochloric acid, and is again converted into " chloride of lead."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 20 (*enlarged series*), p. 369; Mechanics' Magazine, vol. 57, p. 495; Journal of Gas Lighting, vol. 3, p. 30.]

A.D. 1852, June 24.—N° 14,185.

BELL, THOMAS.—" Improvements in the manufacture of sul- " phuric acid." These are, first, " applying currents of electricity " in sulphuric acid chambers or apparatus " thereby promoting " the union of oxygen and sulphurous acid." To produce electricity, numerous jets of steam are passed through narrow passages, in preference using the hydroelectric machine, " known as " Armstrong's"; to the end of the collector a bar " of lead or other " suitable metal " is affixed and passed " into a glass pipe in connection with the chamber, and from the end of which rod the " electricity streams." Nitre is used in conjunction with electricity but the quantity is " reduced in proportion to the employ- " ment of currents of electricity."

Second, " obtaining and applying ozone to act on a continued " production of sulphurous acid in the manufacture of sulphuric " acid." Boxes or chambers of iron or earthenware, have pipes *leading from* their upper part into a sulphuric acid chamber *and near the bottom* of each a tray with phosphorus partially immersed in water, and "about 8 inches from the bottom are two " holes in front of each box, about three-eighths of an inch " diameter." The sulphurous acid is obtained " by burning " sulphur or matters containing sulphur."

[Printed, 4*d*. No Drawings. Repertory of Arts, vol. 21 (*enlarged series*), p. 52; Mechanics' Magazine, vol. 58, p. 18.]

A.D. 1852, July 6.—N° 14,198.

ROBERTS, Martyn John.—"Improvements in the production " of electric currents in obtaining light, motion, and chemical " products and effects by the agency of electricity, part or parts " of which improvements are also applicable to the manufacture " of certain acids, and to the reduction of ores." These are, in reference to this subject, first obtaining currents of electricity " more economically than hitherto " by repeatedly using or " applying certain materials in the production thereof." In a battery with platinum, iron, and nitric acid nitrous fumes are given off, and nitrate of iron is in solution. The gases are brought " into contact with as large a surface of water as possible " along with oxygen or atmospheric air, "which will cause a chemical " union of the gases to as to form nitric acid, which will be " absorbed by the water." The nitrate of iron is distilled for nitric acid into a receiver containing water; the oxide of iron remaining is converted "into metallic iron by smelting it with " carbon in the usual way." When other metals are used in place of iron, "the products of the battery" are treated "in a similar " manner." When sulphuric acid is used in place nitric, the sulphate of iron is formed and is distilled for sulphuric acid, and the remaing oxide smelted as before. Ores of copper are treated with nitric acid, and "that nitrate is then decomposed by means " of any other suitable metal and an electric current so as to " obtain metallic copper, nitrous, and a nitrate," and these products are treated "in like manner as before." Sulphuric acid may be substituted for nitric acid.

Second, "an apparatus consisting of a pipe or series of pipes " opening freely from one into another and filled with flints or " some substance not easily acted on" by nitric acid. Water is made to flow through these pipes so as to keep the flints, &c. continually moist while nitrous fumes with air or oxygen are passed through them. A strong solution is obtained by causing the water to be repeatedly passed through the tubes.

[Printed, 1*s*. 6*d*. Drawings. Mechanics' Magazine, vol. 58, pp. 41 and 56.]

A.D. 1852, July 6.—N° 14,208.

LOSH, WILLIAM SEPTIMUS.—"Improvements in obtaining " salts of soda." These are, on exposing "alkali waste, tank stuff, " or vat residuum" from soda, making for a few days "to the " action of the atmosphere, a saline efflorescence will be produced;" the alkali waste is then stirred with water in tanks, the clear solution drawn off, and soda or its carbonate added until no more precipitate is formed, and the liquid evaporated yields salts, " principally sulphite and hyposulphite" of soda, which "may " be purified still further, if desired," by recrystallization.

[Printed, 4*d*. No Drawings. Mechanics' Magazine, vol. 58, p. 57.]

A.D. 1852, July 22.—N° 14,238.

KIRKHAM, JOHN, and KIRKHAM, THOMAS NESHAM.—"Improvements in the manufacture of gas for lighting and " heating." These are, in reference to this subject, in purifying gas, "the use of oxychloride or subchloride of antimony," which substance, it is said, "may be obtained economically by " acting upon the sulphuret of antimony, or common antimony " ore, in a state of powder, with muriatic acid. The mixture of " acid and ore should be boiled almost to dryness, and the residue " well washed with boiling water, when it will be fit for use. In " this state the subchloride of antimony has the appearance of a " whitish grey powder, and may be used in the purification of " gas, either in a dry lime purifier or in a wet lime purifier." If in a dry lime purifier it is damped while mixed with sawdust, and the gas passed through it until the gas ceases to be purified. " The mass now converted into muriate of ammonia and orange " sulphuret of antimony must be removed, and when the " muriate of ammonia has been extracted by water, a little " muriatic acid may be added to the mass," and "the whole " exposed to the air for a few hours, after which it may be again " employed for the purification of gas as before." In nsiug the subchloride in a wet lime purifier, it is mixed with water, and forms a creamy fluid; the gas is passed through it "until it ceases "to be purified." The contents are run out, the golden colored sulphuret is allowed to settle, and is collected, washed, and dried, is used as "a pigment, or for mixing with caoutchouc;" the clear fluid is mixed with fresh subchloride, and the process of purification is continued until the liquid becomes saturated with ammoniacal salt, when it is crystallized. The other parts of this Specification refer to the making and distributing of gas.

[Printed, 3*s.* 10*d.* Drawings. Mechanics' Magazine, vol. 58, p. 117; Engineers and Architects' Journal, vol. 16, p. 112; Journal of Gas Lighting, vol. 3, p. 30.]

A.D. 1852, August 12.—Nº 14,260.

LAMING, Richard.—"Improvements in the manufacture and "the burning of gas, in the treatment of residual products of "such manufacture, and of the distillation of coal or similar sub-"stances, and of the coking of coal." These are, in reference to this subject, first, converting the "residual product of the puri-"fication of coal gas which contains sulphur mixed with certain "compounds of iron, and generally also of calcium, and with "ammonia and vegetable or carbonaceous matter," by "exposing "it to the atmosphere on an iron plate, or a hearth heated by a "fire or a flue constructed beneath it, until the sulphur contained "in the residue burns with its characteristic blue flame," and "by means of a damper protect the residue from any further "elevation of temperature," stirring "until the sulphur has "almost entirely burned away." The residue, consisting "chiefly "of oxide of iron when somewhat damp, is fitted for the puri-"fication of coal gas from its sulphuretted hydrogen;" the sulphurous acid which is formed may be conveyed out from the apparatus "into covered vessels partly filled with raw or distilled "gas liquor or containing ammonia, its carbonate or its hydro-"sulphate dissolved in water or otherwise, or else one or more "of the corresponding compounds of the oxides of sodium or "potassium;" the result is "a sulphite or hyposulphite, or both, "or a solution of sulphur in a sulphite of the particular base "employed, the uncondensable gases being allowed a means of "escape."

Second, "obtaining from the residual products of the purifica-"tion of gases above referred to crude sulphur and oxide of iron "either mixed together or separate," by agitating it with water and *running the whole* "upon a metallic cloth or sieve, just fine

" enough to arrest everything larger than ordinary sawdust, " having first placed below the first sieve a second one made of " wire gauze, and of fineness similar to that in common use for " blinds, and which serves to retain everything but the liquid " itself and such impalpable powders as it holds in suspension. " The liquid being left at rest, the oxide of iron and sulphur, " mixed perhaps with other matters, become deposited," the liquid is drawn off and the sediment is dried; or the sulphur is separated from the residual product by exposing it to a current of superheated steam (a temperature of about 300° answers the purpose), by which the sulphur is carried off to be received with it into water, from which it may afterwards be recovered by subsidence. The steam leaves the iron behind in a condition conducive to its subsequent usefulness for purifying gas, either immediately or after a short exposure in a moistened state to the atmosphere.

Third, "the manufacture of sulphate of ammonia from the " ammoniacal products above referred to," as follows:—First, converting "the said ammoniacal products by any known means " into ammonia or the carbonate of that base," and submitting " either or both of these re-agents to the action of sulphurous " acid," in preference by passing sulphurous acid gas "over the " ammonia or its carbonate in solution contained on floors of " long and shallow leaden chambers," and exposing "the sulphite of ammonia which thence results to the simultaneous " influences of air and water, by which it is rapidly converted " into a solution of sulphate of ammonia, which may be evaporated and crystallized in the usual way."

Fourth, "the extraction of the alumina from the coke or the " ash of boghead or similar coals by hot sulphuric acid;" the solution may be concentrated by evaporation, or "may be made " into alum in the usual way;" also, treating the coke of boghead or similar coals as follows:—"The ignited coke never lies " in heaps of more than a few inches thick," and "its temperature never rises from any cause high enough to fuse together " the alumina and the silica with which this kind of coke " abounds;" by these means the coke is reduced to a white ash. " Sometimes, instead of first reducing the coke to a white ash," lixiviating the coke itself.

[Printed, 4d. No Drawings. London Journal (*Newton's*), vol. 42 (*conjoined series*), *p. 266*; Mechanics' Magazine, vol. 58, p. 175; Journal of Gas Lighting, *vol. 3, p. 59*.]

A.D. 1852, August 12.—N° 14,262.

BEKAERT, François Bernard.—(*A communication.*)—"Improvements in the manufacture of zinc white."

[No Specification enrolled.]

A.D. 1852, September 30.—N° 14,312.

HUNT, William.—"Certain improved modes or means of "producing or obtaining ammoniacal salts." These are, first causing sulphurous acid gas and ammonia, either gaseous or "when contained in the ammoniacal liquors from gas works," to "percolate through a condenser or chamber containing a mass of "broken materials such as coke, pebbles, stones, or other substances" which are not liable to be acted upon by the chemical agents, and "whereby the acid gas and ammonia are brought into "intimate contact." "The sulphited ammoniacal liquor" thus prepared is evaporated slowly by the spare heat of the retorts, and the sulphite is gradually converted into sulphate.

Second, the application as above described of the waste gases of the vitriol chambers.

[Printed, 8*d*. Drawing. Mechanics' Magazine, vol. 58, p. 315; Journal of Gas Lighting, vol. 3, p. 179.]

A.D. 1852, October 23.—N° 14,337. (* *)

LAMB, James, and MENDAY, Joseph.—"A method of economizing the waste heat of lime kilns."

The wall of the kiln is, as usual, of brickwork, and built in the form of an inverted cone, and the material is thrown in from above, and when calcined is drawn away through an aperture near the floor. When in work a great mass of heat is collected in the interior of the kiln, which heats the conical walls to an intense degree, a great portion of which escapes by radiation into the air, and is wasted and lost. To utilise some of this heat a chamber is formed of copper or iron like a hollow ring, that goes round the kiln near its top where the heat is greatest, with a flue behind it made in the thickness of the wall. The annular chamber being supplied with water, a large quantity of steam is rapidly generated by the heated ring during the process of calcination, and which is led off to work a steam engine.

To increase the effect, a series of horizontal pipes extend across the opening from one side of the ring to the other, and intercepts a portion of the heat that rises from the gases of the lime in calcination; or the pipes set radially meet in a large central vertical pipe, having branch connections with the steam space of the annular chamber. A furnace is placed at the extremity of the annular flue.

[Printed, 1s. Drawings.]

A.D. 1852, November 13.—Nº 14,346.

PETRIE, William.—" Improvements in obtaining and applying " electric currents, and in the apparatus employed therein, part " or parts of which improvements are applicable to the refining " certain metals, and the production of metallic solutions and of " certain acids." These are, in reference to this subject, first, employing " solution cells " in the process of making sulphuric or nitric acid, metallic solutions or solutions for supplying galvanic batteries. The " solution cell " is a vessel containing loose matter, with liquid passing through it, and worked so that the liquid has its level above the loose matter, so as to spread freely to all parts of the surface, passing down every vertical line of the loose matter from top to bottom, and flows off at a higher level; and also consists in a cell of the same nature, but compound, that is so divided by partitions that the liquid shall pass alternately upwards and downwards once or oftener before flowing out; or they may be cells dropping fluid one into another; likewise, enclosing these cells with materials to preserve the elevation of temperature within them when required. Further, employing one or a series of these " solution cells " " charged with such material as fine " silicious sand or calcined pulverized flint," and " slowly transmit " through them such turbid or discoloured acids or solutions " " as sulphuric acid, containing carbonaceous matter, to improve " the liquid thereby."

Second, using these cells charged with matter in a divided form, such as will yield an acid by decomposing nitrogenous matter placed amongst finely divided solid matter as sand, and with aqueous liquid passing continuously through the series of cells, or with liquid of the same nature as the said matter, " or sulphurous " acid in solution." Water is first impregnated with alkali, and dropped slowly through a series of these cells, the sand having mixed with it " offal from shambles chopped fine," a nitric salt *is obtained* which may yield nitric acid.

Third, making acid solutions of muriate of ammonia, sulphate of copper, or nitrate of silver, by using deep "solution cells," and using in the two first cases acid water, and in the third nitric acid acting on "the granulated alloy of gold and silver."

Fourth, acting on "the granulated alloy of gold and silver" with nitric acid in a series of solution cells on the "differential " system," that is, "adding at intervals a cell charged with fresh " alloy to the lower end of the series, and removing the upper- " most cell."

The remainder of this Specification is connected with Electricity.

[Printed, 1*s*. 4*d*. Drawing. Mechanics' Magazine, vol. 58, pp. 404 and 442.]

PATENT LAW AMENDMENT ACT, 1852.

1852.

A.D. 1852, October 1.—N° 84.

PETTITT, Edwin.—" Improvements in the manufacture of " ammoniacal salts and manures." These are, adding to "nitro- " genous solids, as fish, or the flesh of marine or land animals," acid in certain proportions, as sulphuric, stirring occasionally, " until the mass assumes" a pasty consistency, sometimes applying heat. The acid is drawn off and " evaporated almost to dry- " ness;" the sulphate of ammonia is crystallized out. " To obtain " muriate of ammonia" adding to the pasty mixture, or the liquid drawn from same, lime, distilling to dryness, passing the vapours into muriatic acid or muriate of iron contained in vessels "known " as Woolf's apparatus." The muriate of ammonia may then be crystallized by evaporation.

Manures are made of the pasty mass above by drying it; or the fish or animal matters are dried, ground, and treated with sulphuric or muriatic acid in certain proportions.

[Printed, 4*d*. *No Drawings.*]

A.D. 1852, October 1.—N° 104.

ROBERTS, Martyn John.—Improvements in the manufacture of oxides of zinc and tin. These are, first, manufacturing the oxide of zinc by heating " zinc alone or combined with " other bodies, as sulphur," in a furnace, and passing " over or " through it a current of steam or a rapid current of air;" when steam is employed, oxide of zinc is formed and sulphuretted hydrogen is evolved, and may be utilized; with air oxide of zinc is formed; in both cases the oxide is carried away by the rapid current, " leaving the heated matter with a fresh surface for " the further action of steam or air upon it."

Second. Acting as above on metallic tin, but the oxide being heavier " than that of zinc, will not be blown off with the " current."

[Printed, *4d.* No Drawings.]

A.D. 1852, October 1.—N° 141.

PRICE, Astley Paston.—" Improvements in the manufacture " citric and tartaric acids, and of certain salts of potash, soda, " ammonia, lime, and baryta." These are, first, " combining " citric acid contained in lemon or lime juice," &c. with " potash, " soda, or ammonia," filtering or decanting the solution and decomposing it with salts of lime, baryta, or strontia, and again decomposing these salts by sulphuric acid, and crystalizing out the citric acid and the other salts. The proportions in which the various salts of these bases are to be used are given, and the manufacture of citric acid as above, in which the different salts of the above bases are employed, is claimed.

Second. " The manufacture of citrate of lime and citrate of " baryta," as above.

Third. " In the manufacture of tartaric acid," combining bitartrate of potash with ammonia so as to form tartrate of ammonia and potash, by neutralizing impure " bitartrate of potash, or " crude argol, or crude tartar, with gas liquor," or ammonia, or with carbonate of ammonia, &c., and with potash and soda, decomposing the tartrate by means of salts of lime, baryta, or strontia, and again decomposing these salts by sulphuric acid. The proportions in which the various salts are employed are given, and the use of the various salts in making tartaric acid are *claimed.*

Fourth. The manufacture of tartrates of lime and baryta as above.

Fifth. " Obtaining and refining bitartrate of potash " by adding to crude tartars, &c., " potash, soda, or ammonia, and obtaining " soluble, double, and neutral tartrates," which " are separated " from the insoluble impurities," and " decomposed by means of " acids or acid salts." The crude tartar is mixed with a solution of sulphide of sodium, sulphuretted hydrogen is liberated, and the solution of the double tartrate of potash and soda decanted or filtered, and the salt crystallized till pure, when it is dissolved and sulphurous acid gas passed into the solution, until there is no further precipitation, on adding a " small quantity of an acid " stronger than tartaric acid to a portion of the solution;" the solution is drawn off, re-saturated with tartrate of potash and soda treated with sulphurous acid, and the solution " neutralized with " sulphide of sodium or carbonate of soda, and concentrated, " when tartrate of potash and soda, sulphite of soda (and if sul- " phide of sodium has been employed) hyposulphite of soda will " crystallize out." " A solution of tartrate of potash and soda, " obtained as before described, may be decomposed with bisulphate " of potash or soda, or acid sulphites of soda." Tartrate of ammonia and potash are decomposed " by means of acids and acid " salts."

Sixth. In making purified bitartrate of potash, employing " sulphide or sulphides of sodium to neutralize impure bitartrate " of potash," decomposing the tartrate of potash and soda " by " means of sulphuric or hydrochloric acid ;" also by decomposing tartrates of potash and soda, or of potash and ammonia, or of potash " by means of nitrate of soda, chloride of sodium, or " sulphate of soda," " so as to obtain tartrate of potash and " soda," and decomposing that salt " by means of sulphuric or " hydrochloric acid."

Seventh. Neutralizing the bitartrate of potash contained in crude tartars, &c., by sulphide or sulphides of potassium, and " decomposing such tartrate of potash by nitrate of soda, so as to " obtain nitrate of potash, and tartrate of soda and potash, which " may be separated by crystallization."

Eighth. " The manufacture of nitrate of potash and tartrate of " soda by the decomposition of tartrate of potash by nitrate of " soda ;" also, " by the decomposition of tartrate of soda and " potash by nitrate *of soda.*"

Ninth. "The manufacture of nitrate of potash and tartrate of "potash and soda, by decomposing tartrate of potash (obtained "by neutralizing bitartrate of potash by carbonate of lime or "lime) by means of nitrate of soda."

Tenth. "The manufacture of chloride of potassium, sulphate "of potash and tartrate of soda by decomposing tartrate of potash and soda by chloride of sodium or sulphate of soda."

Eleventh. "Decomposing tartrate of potash and ammonia by "means of nitrate of soda," obtaining nitrate of potash.

Twelfth. Decomposing tartrate of potash and ammonia with nitrate, sulphate, and muriate of soda.

Thirteenth. *Decomposiny "tartrate of potash with nitrate of "ammonia, so as to produce nitrate of potash and tartrate of "ammonia."*

Fourteenth. *Nitrate of lime is made by decomposing nitrate of soda with chloride of calcium; also, nitrate of baryta with sulphate of lime, all in certain proportions. Nitrate of barytes is made by mixing solutions of chloride of barium and nitrate of soda, in certain proportions.*

By a Disclaimer, filed November 5th, 1853, all the above in italics is disclaimed.

[Printed, 10*d.* No Drawings.]

A.D. 1852, October 2.—N° 154.

BROWN, David Stephens.—(*Provisional protection only.*)—"Obtaining useful products from sewers." The air in sewers is drawn into a chamber in which is carbonic or other acid, which unites with the ammonia in the air, and thus forms a salt, "according to the nature of the acid," and which is "removed "from time to time" "as it accumulates."

[Printed, 4*d.* No Drawings.]

A.D. 1852, October 5.—N° 237.

JÄGER, Herm.—(*A communication.*)—"Improvements in the "treatment of cotton and other similar fabrics by the introduction "of chemical agents to supersede the use of dung in the dunging "process." These are the application and use of soluble silicates, preferring "the combination of silica and soda" prepared "by "melting one part of clean white sand or flint quartz, or any "other crystallized silicic acid, together with two parts of crystallized carbonate of soda; instead of crystallized carbonate of soda

“ its equivalent of soda ash may be used, or any other soda or “ potash salt whose acid being volatile is driven out or decomposed “ by the action of silicic acid on them at a high temperature, as, for “ instance, sulphates or nitrates of soda or potash.” In preference, “ employing soda ash containing but a small amount of caustic “ soda, and of no lesser strength than 54 degrees of pure soda or “ 92 or 93 degrees of carbonates of soda; a soda ash being weaker, “ containing too large an amount of foreign salts as sulphates or “ chlorides of soda will influence the composition of the product “ obtained.” In making silicates of soda using “ different pro- “ portions according to the amount of acting alkali the soda ash “ contains, viz., 100 parts of sand, 77¾ parts of soda ash, contain- “ ing 56 degrees pure soda or 95 degrees of carbonate of soda; 100 “ parts sand 79⅙ parts soda ash of 55 degrees pure soda; 100 “ parts of sand and 80⅗ parts of soda ash of 54 degrees pure soda “ or 82¼ parts of soda ash containing 53 degrees of pure soda.” The materials are well mixed and submitted to a smelting heat till all effervescence has ceased.

[Printed, 4*d*. No Drawings.]

A.D. 1852, October 7.—Nº 295.

WARD, Peter.—“ Improvements in the manufacture of sal- “ ammoniac, and obtaining salts of ammonia.” These are, first, “ lining the domes of the subliming pots with plaster of Paris (sulphate of lime) or such as “ Roman cement, or a composition “ of such substances with sand, carbonate of lime, alumina, or “ the silicates of alumina,” and brushing “ it over with charcoal “ and water, or blacklead and water.”

Second. Adding muriatic or sulphuric acids to gas water after it has been distilled till “ no more ammonia comes over,” and distilling this with lime “ free ammonia comes over.”

Third. “ The use of the muriatic or sulphuric acids for the “ separation of ammonia from coal gas, by mixing them with “ sawdust, tar, bark, the sulphates of lime, barytes, strontia,” &c., so as to hold them, but “ not chemically to combine with them.”

Fourth. “ The use of sulphurous gas for the separation of “ ammonia from coal gas.” This is effected by putting into the retorts along with the coal “ copperas (sulphate of iron);” or, the sulphate of iron is decomposed in a separate retort, and the sulphurous gas passed “ into the gas main.”

[Printed, 4*d*. *No Drawings.*]

A.D. 1852, October 13.—N° 367.

FONTAINEMOREAU, Peter Armand Le Comte de.—(*A communication.*)—" A certain chemical combination for the silicatisation of calcareous matters." This consists in "the application " of the soluble silicate of potash," to the above purpose; the soluble silicate of potash is used "in the state it is found in " commerce," or it is prepared "in the usual way, taking by " preference that which is the richest in siliceous matter." This " is based " upon the reaction of silicate of potash on the lime of " such calcareous matters, and its consequent conversion into " silicate of lime."

[Printed, 4*d*. No Drawings.]

A.D. 1852, October 13.—N° 377.

ROBERTS, Martyn John.—" Improvements in galvanic bat" teries, and in obtaining chemical products therefrom." These are, first, employing antimony or bismuth as "the positive plate in a " galvanic pair or series in combination with platinum or some " other substance electro negative thereto, as the negative plate," and exciting them "to action by nitric or other acid."

Second, "obtaining oxide of antimony and oxide or bismuth " when nitric acid is employed as above.

[Printed, 4*d*. No Drawings.]

A.D. 1852, October 14.—N° 390.

SWINDELLS, John, and NICHOLSON, William.—" Im" provements in obtaining oxygen gas and applying it in the " manufacture of various acids and chlorine, for oxydating " metallic solutions, and for ageing and raising various colouring " matters." These are, first, "obtaining oxygen gas by the " aid of the compounds;" these are barytes "either alone or " mixed," with "powdered silica, lime, magnesia or alumina, or " silicate of alumina," in order "to keep the barytes in an open or " porous state to prevent it from fusing," and "from acting on " the retorts."

Second, "The use of earthenware retorts, or retorts of other " substances lined with earthenware, as applied to the manufacture " of oxygen gas." The barytes, &c., are spread in the bottom of the retorts such as are employed for gas, and kept at a dull red heat while air, sometimes hot and sometimes cold according to the heat of the barytes, is passed over it until the barytes or "protoxide of barium is converted into the duetoxide commonly "called the peroxide of barium." The retorts are then connected with a gasometer and the temperature raised, and a little steam either at a low or high temperature is passed into the retort, until the oxygen gas, &c., "is passed into the gasometer."

Third. Employing oxygen gas produced as above or by any other suitable method for the following purposes.

In making oxalic acid, by passing "streams of oxygen gas, "either pure or mixed with a portion of atmospheric air, through "the mixture of nitric acid and other matter," or the oxygen gas is passed "along with the compounds of nitrogen and oxygen "produced in the manufacture of oxalic acid as usually conducted," so as to recover the nitric acid.

In making acetic acid, passing it as above through any fermented saccharine solution.

In making nitric acid, passing nitrogen gas, in preference with an excess of oxygen, through tubes filled with porous substances "heated to full redness," "duetoxide of nitrogen" is produced, and is further oxidated into nitric acid by oxygen.

In producing chlorine, oxygen alone or mixed with air, is passed "through the chloride of manganese or iron at a red heat," or adding to hydrochloric acid nitric acid, and heating the same "so as to produce chlorine and nitrochloric acid" this "is "brought into contact with oxygen gas" with the vapour of water nitric acid is produced and the chlorine is conveyed where required; or by "passing oxygen gas into mixtures or solutions of "hydrochloric acids and the oxides of manganese and iron in a "liquid state, or by passing the same through heated earthenware "tubes;" but the first two processes are preferred.

In making sulphuric acid, passing oxygen as above through red hot tubes filled with porous substances mixed with sulphurous acid gas and air and steam.

In making "highly oxydized solutions of various metals, passing gas through the same either without or with the conjunction "of nitric acid."

Ageing or peroxidizing "the mordaunts made use of in printing "or dyeing textile materials or fabrics," by oxygen gas alone or "mixed with air and also for "raising the colours employed" as above, either during the making of the colours or "after they

" are applied to the fabrics." If the latter, by "passing the " goods through a vessel or room into which the gas is ad- " mitted;" or water, in preference distilled water, is impregnated " with pure oxygen gas, and this water is employed "for the " above purpose."

[Printed, 4*d*. No Drawings.]

A.D. 1852, October 16.—N° 419.

JOHNSON, JOHN HENRY.—(*A communication.*)—" Improve- " ments in the manufacture and applications of hyposulphite and " similar compounds of zinc." These are first, " producing the hyposulphite and bisulphurets of zinc. " A strong solution of potash " or other caustic alkali is boiled with sulphur until combina- " tion takes place, when a current of sulphurous gas is passed " into the solution to saturation; this solution added to one of " acetate of zinc the hyposulphite of zinc precipitates. On the " admixture of the solution before passing sulphurous acid gas " through it, with a solution of the sulphate of zinc," a bisulphuret of zinc is produced.

Second. Treating caoutchouc by incorporating the above substances with it, and subjecting the mixture to heat.

[Printed, 4*d*. No Drawings.]

A.D. 1852, October 18.—N° 427.

BELLFORD, AUGUSTE EDOUARD LORADOUX.—(*A communication.*)—(*Provisional protection only.*)—" Improvements in the " manufacture of fuel, part of which improvements are applicable " to the manufacture of gas and soda, and freeing metals from " extraneous substances." These are in reference to this subject in preparing the fuel, which may be turf; it is moistened with water containing " from 2 to ten per cent. of an alkaline salt " forming soluble salts with carbonization with sulphur, phos- " phorous and arsenic." The alkaline salt preferred is chloride of sodium. When the object is to obtain the salts a small quantity of water is employed to dissolve them out of the fuel after carbonization. When the fuel is required for certain purposes washing is not employed to remove the salts and more alkaline salt may be added after carbonization, and chloride of sodium again is preferred. The sulphate of soda first formed, in the presence of carbon, is converted into sulphuret; the other salts are " phos-

" phates and arseniates of soda." When gas is made with this fuel "the ammoniacal salts pass into the state of chlorides." Where acting upon this fuel or upon ordinary coke with certain gases, among these are " chlorine or chlorhydric acid " and carbonic acid, chlorides, are formed with the first and " carbonates of " potash or soda " with the second.

[Printed, 4*d*. No Drawings.]

A.D. 1852, October 19.—N° 443.

CHISHOLM, William.—" Improvements in obtaining caustic " soda and other substances from the residues of articles used in " the purification of gas." These are as follows :—In purifying gas, in preference, peat charcoal is employed mixed with its bulk of common salt, in a dry lime purifyer. When saturated with gas impurities the soluble salts are washed out by steam or water, the solution evaporated, and the " sal ammoniac " sublimed from the " caustic soda." The " sal ammoniac " may be sublimed from the mixture as it comes from the gas purifying, and the residue will be soda and charcoal, from which the soda " must be washed " out and evaporated or crystallized." The damp charcoal may be mixed with common salt for purifying gas. The muriate of ammonia may be mixed with carbonate of lime and distilled into a vessel containing charcoal and chloride of sodium. Carbonate of ammonia distils over and is decomposed, carbonate of soda and muriate of ammonia being formed ; these salts are evaporated from the charcoal as above. When lime is used to decompose muriate of ammonia, instead of carbonate a stream of carbonic acid plays " into the retort containing the charcoal and chloride of " sodium during the operation." Instead of using the purifying material a commercial salt of ammonia may be used. " The " ammonia being always recovered " " may be used over and over, " as may be required."

[Printed, 4*d*. No Drawings.]

A.D. 1852, October 22.—N° 485.

SOUCHON, Jean Marie.—(*Provisional protection only.*)— " Improvements in the manufacture and purification of gas for " illumination, and certain products therefrom, and in apparatus

" for that purpose." These are, in reference to this subject, as follows:—The gas from coal, &c. " is passed, together with the tar " and ammonia which accompany it, through a heated retort " containing potash or soda in a caustic state " or combined with an acid, and " alone or mixed with carbonaceous matters or other " substances." The tar and ammonia may be passed through the above without the gas. The result is that the tar or a portion of the same is converted into gas, and " cyanide or ferrocyanide of " potassium or sodium, which is afterwards extracted and crystallized or used in the production of other compounds of cyanogen." The gas afterwards is passed through a series of vessels containing sulphates of lime, iron, cream of lime, sulphuric or muriatic acid.

[Printed, 4*d*. No Drawings.]

A.D. 1852, October 25.—N° 516.

WALL, Arthur.—(*Provisional protection only.*)—" Improvements in the manufacture of sulphuric and other acids." These are, applying currents of electricity, whether produced from a hydro-electric, voltaic, thermal, or other battery, to the manufacture of sulphuric acid and the production of nitric acid. " The " mode of applying the hydro-electric battery is to place the " rubbers or that part of the machine in the interior of the " passage on one side, and the points on the other side of the " passage which the sulphurous acid traverses to the chamber."

[Printed, 4*d*. No Drawings.]

A.D. 1852, November 1.—N° 590.

PETRIE, William.—" Improvements in the manufacture of " sulphuric acid." These are, first, a furnace for burning sulphur with an open back end covered by a grating and arranged so that drops of melted sulphur shall trickle down between it, " and so that the loose bits or dust of sulphur will not fall " through." Behind this grating is placed a heap of sulphur, and by means of a diaphragm and damper " the sulphur against " the grating will be melted at a very slow rate," and also " the " hot gases are made to sweep against the grating." The pan " where the sulphur chiefly burns is placed slightly inclined " downwards from back to front." Air enters under the doorway. " Beneath the pan or plate on which the sulphur is burnt " *are " very shallow* flues or channels."

Second, a furnace for burning substances not associated with a large quantity of sulphur, "the raw material and the air being "made to move through it in opposite directions." The furnace is fed at its upper part, air is made to enter "at an intermediate "point between the upper and lower part of the material."

Third, the condensation of sulphuric acid fumes by "draught-"cells" in which are fragments of materials, and with or without water; using hot furnace gases into it for the purpose of concentrating the acid; also nitric acid in the aqueous liquid. Platina is used on an extended surface; this is called a stereo-oxidator.

In the Provisional Specification the "draught-cell" is to be "insulated and charged with electricity of tension," but in the Final Specification nothing is said about doing so.

[Printed, 1*s.* Drawings.]

A.D. 1852, November 1.—N° 595.

WATSON, Joseph John William, and SLATER, Thomas.—"Improvements in galvanic batteries and in the application of "electric currents to the production of ellectrical illumination "and of heat, and in the production of chemical products by the "aforesaid improvements in galvanic batteries." These are in reference to this subject, first, "the production of a double salt "of ferrocyanide of zinc and ferrocyanide of iron."

Second, "the production of a double salt of chromate of zinc "and chromate of lead."

Third, "the production of prussiate of zinc and prussiate of "lead." "The use and manufacture of nitrate of iron."

Fourth, "the use and manufacture of "acetic ether, ammonia, "and sulphuric acid from nitrous fumes resulting from the "galvanic arrangements."

Fifth, "the manufacture of plaster of Paris."

Sixth, "the manufacture of white lead."

With a Maynooth battery composed of zinc, iron, dilute sulphuric acid and nitrous or nitric acid, adding a salt of cyanogen, ferrocyanide of potassium preferred, the products are "ferrocyanide of zinc and ferrocyanide of iron," 'nitrous fumes, "nitre, sulphate of potash, and hydrogen gas." After the working of the battery is over the materials are treated with an additional quantity of the cyanogen salt. "Nitre and sulphate of "potash are at liberty," and are crystallized out from the solution.

When zinc, iron, and sulphuric acid, and a cyanogen salt (ferrocyanide of potassium) are used "a splendid blue pigment will " result;" also sulphate of potash and hydrogen gas. When the nitrous fumes from this and other batteries to be mentioned are conveyed into a chamber where sulphur is burnt the sulphurous acid is converted into sulphuric acid; if conveyed into a chamber lightly filled with wood shavings they are converted "into acetic " ether by admitting to them in the chamber so prepared the " ammonia from other batteries." The nitrous fumes are brought with water in contact with the old iron cells or plates, and form nitrate of iron to be used in a battery.

When a Smee's battery is employed, with lead, zinc, nitro-sulphuric acid, and a chromate (chromate of potash preferred), the double chromates of lead and zinc are precipitated, and "nitre " and sulphate of potash" are in solution.

With "an iron zinc battery" nitrous and sulphuric acid and a salt of chromium, chromate of potash, the precipitate "is a fine " brown colour. The other products are the same as in the " Prussian blue battery."

When prussiate of potash is used instead of chromate of potash in the lead Smee arrangement, "plumbo-prussiate of zinc" is precipitated.

When a lead battery of the "Maynooth arrangement" is used with prussiate of potash added, a "ferrocyanide of zinc and ferro-" cyanide of lead" are produced separately.

When a small portion of lime is added to the lead battery with chromate of potash, "sub-chromate of lead" is produced a bright scarlet.

When the prussiate of potash is added to the iron cell and chromate of potash to the zinc cell of an iron and zinc battery, " the resulting products having access to each other through a " diaphragm," the colour produced is a green.

A Maynooth battery is charged with nitrate of iron into the iron cells, and dilute sulphuric acid in the porous cells, along with " the cyanogen or chromium salt."

Iron and zinc batteries are used with sea and mineral waters, adding prussiate of potash, "ferro-prussiate of zinc" is produced.

Using a mixture of dilute sulphuric and hydrochloric or muriatic acid, "the colour-making salts are still prussiate and " *chromate* of potash."

To the spent acids after crystallizing out of the salts and the washings containing nitrous or nitric acid or nitrous fumes, adding caustic potash, and crystallizing the nitre. The washings containing sulphuric acid are run on to finely powdered chalk which converts it "into artificial gypsum or plaster of Paris."

The chromates of lead may be converted into chromate of potash by fusing them with caustic potash. The oxide of lead thus formed is converted into carbonate by passing the carbonic acid evolved from the chalk above through water, in which the oxide is suspended.

[Printed, 6*d*. No Drawings.]

A.D. 1852, November 4.—N° 638.

BRACKENBURY, AUGUSTUS.—(*Provisional protection only.*)—"Precipitating the muriate of soda more economically than the "process now adopted." The apparatus used consists "of a "wooden vessel or pan fourteen feet square and eighteen inches "deep. Brine is put in to the depth of twelve inches. In the "middle of the vessel or pan is a twelve-inch square hole, on the "edges of which a wooden pipe is fastened, fourteen inches high "and twelve inches square, inside measure. The joint is water-"tight." On "the surface of the brine is laid a wheel 10 feet in "diameter and three inches thick. A round hole is made in the "centre eighteen inches in diameter; over this is a dome eighteen "inches diameter, flat at the top, and twelve inches high. It is "fastened air-tight to the under surface of the wheel by a rim "one inch broad; it is made of zinc. The wheel rotates, and "is attached to a square-sided sliding shaft, whereby the wheel "can adjust itself to the increase and decrease of the brine. The "boxes have square holes for the shaft to pass easily through. "The bearings for the boxes are fastened to a beam resting on "the sides of the wooden vessel or pan." "Four feet from the "wooden vessel or pan stand two vessels, each four feet square "and four feet and a half high, including a false bottom six "inches deep. In the centre of the bottom of each vessel is a "twelve-inch square hole. On the edges of each square hole is "fastened a pipe three feet long and twelve inches square, inside "measure. The joints are water-tight." Near the top of each pipe a valve opens "to admit air or gas into each of the false bot-"toms of the vessels, and shuts to prevent its return." A metal pipe is fastened air-tight to the outside of each of the vessels, " communicating with each of their false bottoms. The joints " are air-tight. The opposite ends of the iron pipes join and " form one pipe which passes under the wooden vessel or pan and " rises through it into the wooden pipe. There is a rim on the " end of the iron pipe one inch broad, which fastens to the upper " edges of the wooden pipes. The joint is water-tight." "Water " is put into each of the vessels four feet square to the depth of " three feet; on each surface of water an inverted vessel three " feet square and three feet deep is placed. On their tops are " valves for the admission of air or gas. The two inverted vessels " are connected by a moveable beam supported by ironwork pre- " fixed to the sides of the four-feet square vessels. By depressing " one of the inverted vessels the valves of the top close, and the " air or gas underneath the inverted vessel escapes through the " pipes and false bottoms," and from thence to the under surface of the wheel, and the upper surface of the brine to the periphery of the wheel, where it makes its escape carrying with it a quantity of vapour. The salt contained in the vapour precipitates. "When one of the inverted vessels is fully depressed " the elevated one is then depressed, and so on alternately." " Heat is applied to that part of the pipe extending from one " vessel to the other." "The air before it passes into the inverted " vessels passes through muriate of lime" in order to deprive it of moisture. "The gas preferred is carbonic acid gas; the air, " the atmospheric air."

[Printed, 4*d*. No Drawings.]

A.D. 1852, November 6.—N° 663.

AUGIER, JOSEPH VICTOR.—(*Provisional protection only.*)— " Improvements in the manufacture of gas and in the machinery " or apparatus employed therein." These are, in reference to this subject, producing the alkaline cyanurets of potash and " soda by means of liquid or gaseous hydrocarburets, in the " operation" of gas making. The gases from the retorts are brought directly into a cylinder resting upon a circular furnace and containing "a quantity of potash or common soda;" in this cylinder is "a horizontal shaft provided with two agitators or " fans." "The cyanuret removed from the cylinder is converted" " into common prussiate of potash by means of solution in a salt " *of iron*" with "a few drams of alkali." For potash and soda

" their anhydrous sulphate, or a concentrated boiling solution of " either," may be used. If animal or vegetable charcoal is employed the cylinder without the shaft, &c., is employed. " Other " boiling concentrated solutions of potash or soda," or " dry " alkali in the form of powder," may be employed in producing cyanurets.

[Printed, 4*d*. No Drawings.]

A.D. 1852, November 8.—N° 676.

NEWTON, William Edward.—(*A communication*).—" Improvements in the manufacture of the carbonates of soda."

These are first, " the decomposition of sulphuret of sodium by carbonic acid for making soda ash," &c.

Second, " the preparation and use of the monohydrated car- " bonate of soda for the manufacture of bicarbonate of soda and " soda solaratus."

Third, employing and purifying " carbonic acid, derived from " the combustion of coke, anthracite, or other mineral coal, for " the manufacture of the carbonates of soda."

Sulphate of soda in powder is mixed with about half its weight of powdered coal, charcoal, sawdust, &c., and carbonized at a low red heat, the mass lixiviated with water and the solution of the sulphuret in a series of tanks placed one above the other saturated with carbonic acid obtained as above after passing through water, in which is suspended a small quantity of chalk. The sulphuretted hydrogen evolved " may be recovered or made into compounds of " sulphur by means well known to chemists."

The solution of carbonate of soda above is filtered and boiled down until a crystalline powder separates, this is " monohydrated " carbonate of soda;" commercial soda ash may be dissolved and treated in the same way for this salt, which " is ladelled out of " the liquor, drained," cooled, powdered, spread upon frames in a tight chamber, and carbonic acid is forced into it until " the " saturation is complete."

[Printed, 4*d*. No Drawings.]

A.D. 1852, November 9.—N° 690.

BOOTH, James Curtis.— " Manufacturing chromate and " bichromate of potash from chromic iron or chrome ore." The ore in powder is mixed with a certain proportion of powdered charcoal, and heated in a reverberatory furnace so as to reduce all or nearly all the iron to the metallic state, when it is treated with dilute sulphuric acid, and when all the iron is dissolved the residue is washed, dried, and mixed with carbonate of potash or carbonate and saltpetre, and treated as in the old process. The sulphuric acid solution of the iron may be evaporated for the proto-sulphate of iron or copperas.

[Printed, 4*d*. No Drawings.]

A.D. 1852, November 9.—N° 691.

GOSSAGE, William.—"Improvements in obtaining sulphur "from certain metallic sulphurets." These are, extracting sulphur "in the solid form from the sulphuret of calcium" in the "alkali waste;" also from "sulphuret of sodium produced by "decomposing sulphate of soda by means of carbon; also from "sulphuret of potassium produced by decomposing sulphate of "potash by means of carbon." Sulphuretted hydrogen gas is evolved from the above substances by means of carbonic acid, or "by means of muriatic acid" "the last portions of the gas are "driven off by injection of steam into the apparatus. The gas "mixed with other gases is caused to filter through "burning "coke or coal together with a suitable quantity of atmospheric "air," or is "introduced into a flue conducting from the said "furnace" along with some air. When sulphurous acid gas is used "to assist in decomposing the sulphuretted hydrogen gas of "the said mixed gases," such gas is introduced into the furnace used for burning "coke or coal, or into the flue of such furnace "together with the said united gases." In preference the gases with the regulated quantity of air pass through a furnace where they are heated to redness, and into a tower in which is a series of perforated arches so as to complete the mixing of the gases, from the upper part of which they pass through a tube surrounded with water, into the upper part of a tower nearly filled with broken bricks, &c., supported upon iron bars, below which is "an "iron pan for receiving liquid sulphur as this flows from the "condensing tower."

Reference is made to N° 7416.

[Printed, 1*s*. Drawings.]

A.D. 1852, November 15.—N° 746.

COWEN, Joseph, and RICHARDSON, Thomas.—"Improvements in the manufacture of sulphuric acid." These are, first,

" applying heat externally to iron or copper pyrites," or other suitable metallic sulphuret, in a D-shaped vessel, or "any other " shaped gas retort, one end of which is connected with an " ordinary sulphuric acid chamber and the other end being left " partially open." This end is a door with " a small slit in the " middle about three inches long and one inch wide, which serves " the double purpose of admitting air and an iron rake employed " in agitating the sulphurous ore." In the Final Specification " it is said that the sulphates of copper, iron, and zinc may be substituted for their sulphurets.

Second. " Employing retorts made of clay, or clay or tile " bottoms surmounted by a brick arch for the above purpose;" the same are heated from below. " Common gas-clay retorts" answer the above " purpose best; but a fire-tile bottom, covered " with a brick or iron arch, will also supply the place of the " retort."

[Printed, 4*d*. No Drawings.]

A.D. 1852, November 17.—N° 772.

BELL, ISAAC LOWTHIAN.—" Improvements in the treatment of " certain compounds of iron and sulphur." These are, the fusion of " tank residuum, or soda makers' waste," consisting " principally of sulphur and lime," with oxide of iron, either in the " way described or otherwise, so as to obtain sulphuret of iron." Moist " tank residuum," " burnt pyrites," and " clay or burnt " bricks," all in certain proportions, are fluxed in a blast furnace; when the furnace is tapped the pyrites formed " flows out first, and " the slag runs out afterwards."

[Printed, 4*d*. No Drawings.]

A.D. 1852, November 26.—N° 881.

CONDY, HENRY BOLLMANN.—" Improvements in the manu" facture of acetic acid and acetates." These are, first, purifying crude acetic acid and acetates by distilling them with oxidizing agents, as " bichromate of potash with sulphuric acid, chlorate of " potash with sulphuric or muriatic acid." These substances are preferred when dealing with " rough acetic acid." In " purifying " impure acetic acid contained in acetates chloride of lime is pre" ferred, the solutions being heated, or" the object may be *accomplished by precipitation* by a salt of a base " which is pre-

or nearly all the iron to the metallic state, when it is treated with dilute sulphuric acid, and when all the iron is dissolved the residue is washed, dried, and mixed with carbonate of potash or carbonate and saltpetre, and treated as in the old process. The sulphuric acid solution of the iron may be evaporated for the proto-sulphate of iron or copperas.

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A.D. 1852, November 9.—N° 691.

GOSSAGE, WILLIAM.—" Improvements in obtaining sulphur " from certain metallic sulphurets." These are, extracting sulphur " in the solid form from the sulphuret of calcium " in the " alkali waste ;" also from " sulphuret of sodium produced by " decomposing sulphate of soda by means of carbon ; also from " sulphuret of potassium produced by decomposing sulphate of " potash by means of carbon." Sulphuretted hydrogen gas is evolved from the above substances by means of carbonic acid, or " by means of muriatic acid " " the last portions of the gas are " driven off by injection of steam into the apparatus. The gas " mixed with other gases is caused to filter through " burning " coke or coal together with a suitable quantity of atmospheric " air," or is " introduced into a flue conducting from the said " furnace " along with some air. When sulphurous acid gas is used " to assist in decomposing the sulphuretted hydrogen gas of " the said mixed gases," such gas is introduced into the furnace used for burning " coke or coal, or into the flue of such furnace " together with the said united gases." In preference the gases with the regulated quantity of air pass through a furnace where they are heated to redness, and into a tower in which is a series of perforated arches so as to complete the mixing of the gases, from the upper part of which they pass through a tube surrounded with water, into the upper part of a tower nearly filled with broken bricks, &c., supported upon iron bars, below which is " an " iron pan for receiving liquid sulphur as this flows from the " condensing tower."

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COWEN, JOSEPH, and RICHARDSON, THOMAS.—" Improve- " ments in the manufacture of sulphuric acid." These are, first,

" applying heat externally to iron or copper pyrites," or other suitable metallic sulphuret, in a D-shaped vessel, or "any other " shaped gas retort, one end of which is connected with an " ordinary sulphuric acid chamber and the other end being left " partially open." This end is a door with " a small slit in the " middle about three inches long and one inch wide, which serves " the double purpose of admitting air and an iron rake employed " in agitating the sulphurous ore." In the Final Specification " it is said that the sulphates of copper, iron, and zinc may be substituted for their sulphurets.

Second. " Employing retorts made of clay, or clay or tile " bottoms surmounted by a brick arch for the above purpose ;" the same are heated from below. " Common gas-clay retorts " answer the above " purpose best ; but a fire-tile bottom, covered " with a brick or iron arch, will also supply the place of the " retort."

[Printed, 4*d*. No Drawings.]

A.D. 1852, November 17.—N° 772.

BELL, Isaac Lowthian.—" Improvements in the treatment of " certain compounds of iron and sulphur." These are, the fusion of " tank residuum, or soda makers' waste," consisting " principally of sulphur and lime," with oxide of iron, either in the " way described or otherwise, so as to obtain sulphuret of iron." Moist " tank residuum," " burnt pyrites," and " clay or burnt " bricks," all in certain proportions, are fluxed in a blast furnace ; when the furnace is tapped the pyrites formed " flows out first, and " the slag runs out afterwards."

[Printed, 4*d*. No Drawings.]

A.D. 1852, November 26.—N° 881.

CONDY, Henry Bollmann.—" Improvements in the manu- " facture of acetic acid and acetates." These are, first, purifying crude acetic acid and acetates by distilling them with oxidizing agents, as " bichromate of potash with sulphuric acid, chlorate of " potash with sulphuric or muriatic acid." These substances are preferred when dealing with " rough acetic acid." In " purifying " impure acetic acid contained in acetates chloride of lime is pre- " ferred, the solutions being heated, or " the object may be accomplished by precipitation by a salt of a base " which is pre-

" cipitable, or a base which is insoluble in water," preferring " subacetate or acetate of lead with alkali or alkaline earth, or " salts of zinc, such as acetate or sulphate with an alkali or alkaline earth." To a solution of acetate of lime or soda hexacetate of lead is added " so long as it appears to remove colour from the " solution ;" the liquid is decanted and treated with an alkali or alkaline earth, in preference lime.

Second. " Employing crude acetic acid in producing acetate of " barytes, and obtaining the acid from that salt by employing " another acid for which the barytes has a stronger affinity." Carbonate of barytes or sulphide of barium is gently warmed with crude acetic acid till the acid is saturated. The solution may be crystallized, or the dry salt may be decomposed by " sulphuric " or nitric or hydrochloric acid ; or for the manufacture of acetates " by double decomposition."

[Printed, 4*d*. No Drawings.]

A.D. 1852, November 30.—N° 913.

MURDOCH, James.—(*A communication.*)—" Certain improved " materials for use in painting." These are, the manufacture of driers for painting, by combining the protoxides of cobalt, tin, iron, nickel, or manganese with substances capable of protecting them from the oxygen of the air, so as to keep them in a pulverulent state. The substances preferred are " benzoin, uro-" benzoic, succinic and boric acid, and the acid resins." Benzoate of cobalt is made by saturating a hot solution of benzoic acid with " carbonate of cobalt in fine powder (constantly stirring the " liquor) until there is no longer an effervescence," and the solution is not acid, after which it is filtered and the liquor evaporated to dryness, and the residue " heated until it has lost its water and " taken a clear brown tint." " The benzoate of manganese is " prepared in the same way, only substituting the carbonate of " manganese for the carbonate of cobalt." " The uro-benzoates " of cobalt and manganese are prepared in the same manner," and are preferred as being cheaper. Borate of cobalt is prepared by adding a cold solution of borax to a cold solution of a salt of cobalt as the sulphate. Borate of manganese is prepared in the same way. An alkaline resinate of potash or soda is dissolved in hot water, and the solution is " precipitated by a suitable quantity of " the sulphate or chloride of pure cobalt or manganese." The precipitate is resinate of cobalt or manganese, which is collected on cloths and dried, and reduced to powder.

[Printed, 4*d*. No Drawings.]

A.D. 1852, December 6.—N° 969.

GAUTIER, André Jacques Amand.—"An improved treatment of peat." This consists in tearing or cutting the peat up, washing it with water, moulding it, and drying it in the moulds or drying it without moulding it, and mixing it with resin or otherwise. It may be substituted for wood or coal for domestic use. To render it fit for cooking it is converted into charcoal, and the "products up till now neglected, and principally hydrogen gas which has not yet been sufficiently used," collected. If the purified peat "should emit an unpleasant odour it may be disinfected by plunging it into a water bath accidulated with pyroligneous acid." If the charcoal from this last kind of peat still contain "hydrosulphuric acid," in withdrawing it from the retort it would be sufficient "to submit it to the action of a damp chloride. It will then produce sulphuric acid, which is inodorous, and chlorhydric acid," which smells less than hydrosulphuric acid. "The two new acids may be expelled by means of washings."

[Printed, 6*d*. No Drawings.]

A.D. 1852, December 6.—N° 973.

LAMING, Richard.—(*Provisional protection only.*)—"Improvements in purifying gas, and in obtaining from the products resulting from the purification of gas certain useful compounds." These are, first, in purifying gas, using solutions of bone, "phosphate, apatite, or coprolite in muriatic or nitric acid, mixed with sulphate or muriate of magnesia, either in a fluid state or absorbed into sawdust," &c., in this way forming ammoniaco-phosphate of magnesia, muriate or nitrate of ammonia, and phosphate, carbonate, and sulphate of lime."

Second. "Purifying gas by means of magnesian limestone burned into a caustic state and slaked, and converting the residual sulphuret" into sulphate "by roasting or other mode of oxidation," dissolving out the sulphate to be used under the first head.

Third. "*Purifying gas* by means of the aforesaid magnesian

" compound, or lime mixed with sulphate of soda or sulphate of " potash."

Fourth. " Purifying gas by means of oxides and salts of anti-" mony," " either in dry or wet purifyers."

[Printed, 4*d*. No Drawings.]

A.D. 1852, December 11.—N° 1034.

WAY, John Thomas, and PAINE, John Manwaring.—" Improvements in the manufacture of glass." These are, in reference to this subject, " obtaining a silicate of potash or soda " from substances containing soluble silica ;" the substance named is " a stone or clay formed in Surrey." Two processes are given, first, mixing the clay in powder with carbonate or caustic of the alkalies, and heating the mixture in a reverberatory furnace " to a gentle low red heat." The silicate of the alkali is dissolved out by water, or " by a solution of caustic alkali."

Second, dissolving out " the silica by caustic alkali with or " without the aid of heat ; the last, however, being the method of " dissolving " preferred.

[Printed, 4*d*. No Drawings.]

A.D. 1852, December 14.—N° 1059. (* *)

FLORET, Joseph Paul Marc.—" An improved method of " producing simultaneously gas light and lime or plaster."

This invention " consists in an improved method of producing " simultaneously gas light and lime or plaster." " There is in this " case no fuel used but that which is necessary for the baking of " the calcareous matter or gypsum, and consequently the lime or " mortar may be made at a less expense. The oven is constructed " in the shape of two truncated cones, joined at their bases." " This basis may be wide or oval, so as to allow of placing two or " several retorts. A vault is made in the centre of the oven or " furnace, at the height of the greatest transversal diameter." " The retorts are placed on this vault, and fixed at their bases to " the case of the oven, which is of refractory bricks." The mouths of the retorts come out on the opposite side of the wall. " It is, as " usual, by these ends that the retorts are filled. The baking of " the lime or mortar is made as in continuous ovens or kilns, not " raised to a high temperature, by a mixture of calcareous matter " or gypsum, and coal or coke in suitable proportions, introduced

" in the upper opening of the kiln." " The lime or plaster being " baked becomes red hot, incandescent on the retorts, and circu- " lates round them and heats them. The lime or mortar is with- " drawn by the mouth of the kiln." "The distillation of the coal " is thus effected as perfectly as in a furnace specially adapted for " the purpose. The gas is conducted from the tubes of the retorts " into the gas barrels, and the remainder of the manufacture is " accomplished in the usual manner."

[Printed, 8*d*. Drawings.]

A.D. 1852, December 15.—N° 1063.

ELLIOT, George, and RUSSELL, William.—" Certain im- " provements in boiling down saline solutions." These improvements are said to be " especially applicable to the boiling down " saline solutions which let the salt fall when boiling, instead of " requiring it to be obtained by crystallization after evaporation," and consist " in arranging and constructing the boiling apparatus " so that the heat is made to pass round the pans containing the " solutions and is directed upon them laterally; such pans being " extended downwards beyond the flues, and having working " within them apparatus for collecting the salt from the lower part " or receptacle of the pans, and depositing it in a trough or pipe, " to be suitably conveyed away." By " the expression of lateral " direction relative to the application of the heat " is " meant to " refer to the formation of the pans so that the sides thereof shall " not diverge from the perpendicular beyond the distance of about " twenty-five degrees."

[Printed, 8*d*. Drawing.]

A.D. 1852, December 15.—N° 1069.

TAYLOR, Richard, jun., and PHILLIPS, John Arthur.— (*Letters Patent void for want of Final Specification.*)—" Improve- " ments in treating zinc ores." These are, " dissolving the sulphur " ores of zinc by muriatic acid," and converting the sulphuretted hydrogen evolved into sulphuric acid; or " the ores may be first " calcined and the sulphurous acid similarly used, and the cal- " cined ore dissolved by muriatic acid." In both cases the oxide of zinc is thrown down from solution by lime.

[Printed, 4*d*. No Drawings.]

A.D. 1852, December 16.—N° 1075.

BARLOW, CHARLES.—(*A communication.*)—" Improvements " in bleaching, purifying, and concentrating sulphuric acid, parts " of which invention are applicable to evaporating other liquids." These are as follows :—" Sulphuric acid when it issues from the " leaden chambers," "sp. gr. 1·547 to 1·549," "is usually of a " yellow color, owing to the presence of hyponitric or hypoazotic " acid," which is disengaged when the acid is evaporated, causing a noxious smell and a loss; to avoid this and to bleach the acid, the boiler which receives the acid from the chambers "has a move- " able cover of lead, the edges of which plunge into the acid " and under which a current of sulphurous acid is made to pass. "The " acid combines with the red vapors of the hyponitric or hypo- " azotic acid," forming "sulphuric acid, which remains in the " boiler," and the residual gasses uncombined pass into "the " great sulphur furnace." "The sulphuric acid thus bleached " and purified is afterwards conducted into a second evaporating " boiler of lead, to be there concentrated," having "a moveable " capital or cover, suspended by cords passing over pullies, in " order to raise it to the proper height to permit the atmospheric " air to circulate over the surface of the liquid," and around the bottom of which in the interior is a gutter, " into which flows the " liquid which is condensed upon the whole interior surface of the " capital or cover." To avoid the loss of gases from the lead chambers, employing " the apparatus described by Gay Lussac, " such as pipes containing sulphuric acid and reservoirs contain- " ing coke, together with the apparatus for absorption " described in N° 9558.

[Printed, 6*d*. Drawing.]

A.D. 1852, December 16.—N° 1086.

MICHIELS, GEORGE.—" Improvements in the manufacture and " purification of gas." These are, in relation to this subject, in purifying gas by injecting oxygen gas, " produced by extracting it " from the atmosphere according to the now well-known chemical " fact that the oxide of barium at one temperature will absorb " oxygen, allowing the nitrogen to pass untouched, and at " another temperature will evolve oxygen into " the current of gas coming from the retorts; the sulphur in the gas is converted into hyposulphurous acid, and when the gas is passed through the lime purifiers "hyposulphite of lime" is formed, and is "subsequently converted by the ammonia of the foul gas into "hyposulphite of ammonia," "a valuable article of trade." "When no pure oxygen is at hand," "having a set of dry lime "purifiers at work, and one of them being foul," a large quantity of air is driven through it. Half of the foul lime is then replaced by fresh lime, the foul lime being placed "on one side of an "ideal vertical plane passing through the centre line of the "purifier," the new charge of lime being on the other. The air passages are shut, and "when the foul gas passes through it, the "ammonia will be detained in the state of hyposulphite of "ammonia in the ventilated foul lime."

[Printed, *6d.* Drawing.]

A.D. 1852, December 22.—N° 1135.

ASPDIN, William.—"Improvements in the manufacture of "Portland and other cements." These are, "treating alkali refuse "by washing it, and grinding it and mixing with it a small "quantity of argillaceous earth." The materials are "run off "into backs or troughs to subside," the liquid is "run off and "preserved in order, when it is thought desirable to crystallise "the carbonate of soda therein, and to obtain any sulphur which "may be present." The matter settled in the backs is made into lumps, which are dried, calcined, and ground.

In the Provisional Specification it is stated that "the alkali "refuse as it comes from the manufacturer" is dried and removed into kilns, where the sulphur is sublimed into a fire-brick dome, cone, or flues. "The residue is calcined, ground, and mixed with "the powder obtained from the former process in equal proportions," but this is omitted in the Final Specification.

[Printed, *4d.* No Drawings.]

A.D. 1852, December 22.—N° 1136.

GREENSHIELDS, Thomas.—"Improvements in the manufacture of alkali." These are, "the decomposition of salt by means "of sulphate of lime, fine slack, or coke," and the use of the "residue left in the black ash vats for effecting the decomposition "of salt for obtaining soda salts." Dry ground sulphate of lime and fine slack mixed together are brought to a dull red heat in a reverberatory furnace, when fine grain salt is added and the whole mixed, and the temperature raised to a good red throughout; pulverized coke is now added, "in sufficient quantity to well "separate the fluid mass." When gas ceases to be given off, the mass is allowed to cool, lixiviated with water, the solution filtered, evaporated, and the soda salts obtained are mixed with fine slack and carbonate of lime, and decomposed in a black ash furnace, and when cool the soda salt is dissolved out, and "the liquid "converted into carbonate of soda as is well understood." "The "insoluble residue left in the vats is again used in decomposing "salt as before described."

The proportions in which the sulphate of lime, slack, and salt in preference are used are given, and it is stated that they may all be mixed together before introducing them into the furnace.

[Printed, 4*d*. No Drawings.]

A.D. 1852, December 24.—N° 1166.

NESMOND, Pierre Charles.—"Improvements in machinery "applicable to the manufacture of ice and to refrigerative pur-"poses generally." These are, in reference to this subject, "purify-"ing, concentrating, and modifying the degrees of strengths of acids, "alkalies," and "salts," by "the application of compressed air "when allowed to expand to its original bulk." The air is forced into a vessel called a recipient or condenser, in the upper part of which is a cooling reservoir "containing water for absorbing the "caloric disengaged from the air by condensation." This condenser communicates with a dilatation chamber by means of a tube in which there are two taps. The dilatation chamber is in the lower part of the refrigerator, and they communicate with each other by means of a pipe, and a pipe with a valve and tap serves "to conduct the dilated air from the apparatus."

[Printed, 8*d*. Drawing.]

A.D. 1852, December 28.—N° 1177.

MUCKLOW, Edward.—"Certain improvements in the con-"struction of retorts for the manufacture of pyroligneous acid, or "for other purposes of destructive distillation," designed chiefly to be used in the distillation of "spent dye woods, sawdust, "tanners bark, chips, and other refuse." "If the fire is to be "applied externally the retort is closed at both ends, and in the "centre" is "a hollow perforated cylinder or cylinder of cones," leaving "a space between it and the outside of the retort," into which the wood is placed. This space is large or small according to the material to be distilled. In the centre space may be pipes through which cold water circulates. If the fire is "applied "internally a fire-flue must extend up the centre of the retort. "Around this fire is the space for the wood, &c., enclosed by the "perforated cylinder." In both cases a series of conical rings, "which are provided with small projections" placed one above the other, may be used in place of the perforated cylinder.

[Printed, 6*d*. Drawing.]

A.D. 1852, December 31.—N° 1209.

SMITH, Thomas Benjamin.—"Improvements in calcining "certain ores and in the construction of furnaces for that purpose, and for converting certain products arising in the process "into an article of commerce not heretofore produced there-"from." These are, first, constructing a calcining furnace.

Second, "the mode of calcining, whether the manufacture of "sulphuric acid be combined therewith or not."

Third, "the use of heated air blown into or on to the ore in "the chamber, furnace, or retort."

Fourth, "the manufacture of sulphuric acid from the sulphur-"ous acid obtained in and by the process of calcination."

Employing, "nearly closed chambers, furnaces, or retorts" heated externally and connected with "suitable flues or pipes" to carry away the vapours, "and in which the metals volatilized "are condensed." In making sulphuric acid the sulphurous vapours are carried into suitable chambers, and proceeded with in the usual way. If it is not desired to make sulphuric acid more air may be passed in, which facilitates the calcination. Also at times using "a portion of heated oxygenated air to assist the "calcination of metallic ores."

[Printed, 4*d* No Drawings.]

1853.

A.D. 1853, January 6.—N° 43.

WATSON, William, the younger.—"Improvements in apparatus for the manufacturing of prussiate of potash." These are, emptying or taking out the materials in the above manufacture after "they have been subjected to the action of heat by tubes or "passages communicating with such vessels, whereby such "materials are forced out through such tubes or passages by the "pressure of air, gases, or vapours." The apparatus described is a pan set in a furnace having a moveable cover, through which passes the shaft of an agitator; from the lid of the pan is a pipe for the escape of the gasses. A tube or passage for a tube descends into the pan at one side; this tube is connected with a vessel connected with an air pump, into which vessel the materials when finished are drawn.

[Printed, 6*d*. Drawing.]

A.D. 1853, January 8.—Nº 57.

HENDERSON, William.—"Improvements in manufacturing "sulphuric acid and copper from copper ores, reguluses and "matts." These are said to be as follows:—First, "the combination of kilns, or sulphur ovens, or hot cylinders, with calcining furnaces, for the purpose of oxidizing the sublimed "sulphur in such a manner as to ensure its complete conversion "into sulphuric acid in the subsequent operations."

Second, "the use of nitrous acid, with or without the use of dry "ores, for the purpose of converting the sublimed metals which "are mixed with the sulphurous gases into a higher degree of "oxidation, and thereby facilitating their separation before passing into the vitriol chambers."

Third, "the use of dry condensing chambers between the "furnaces and kilns and the vitriol chambers, for the purposes of "freeing the sulphurous gases from their condensible impurities, "and thereby producing sulphuric acid of greater purity."

Fourth, "the short and economical process," of "producing "sulphuric acid and copper from sulphuret copper ores, where the "impurities are of small amount."

The ores are divided "into three classes; to the first class "belong all ores containing more than 25 per cent. of sulphur, the "second class embraces all ores containing less than 25 per cent. "and more than 10 per cent. of sulphur, and the third class "includes all ores containing less than 10 per cent. of sulphur." The ores of the first class are burned in a series of kilns such as are used "for burning mundic." The burnt ore is raked through the grate into the ash-pit and fresh dry ore is added. "The sul-

" phurous gasses evolved pass through an aperture in the dome " of the kiln into a flue." The ores of the second class are burnt " in calcining furnaces constructed on the plan of "those or- " dinarily in use in copper works," only the flame does not pass over the ore but through flues underneath the ore. "The ores are " crushed and dried before calcining. In calcining, the ores are moved from bed to bed of the furnace until they are calcined. " Hot air is supplied to the beds by iron pipes passing through the " hot flues of the smelting furnace." "The sulphurous gases " evolved pass away through pipes or flues." In treating ores of the third class they are crushed and mixed "without previous " calcination with calcined ores of the first or second class or with " both," and " smelted in the usual manner, the product being a " regulus of copper, and a clean slag." To obtain "sulphur in a " state available for producing sulphuric acid," the regulus is crushed to a powder and calcined in a furnace such as is "em- " ployed for operating on the second class of ores," until about 2 per cent. of sulphur remains. The calcined regulus is mixed with ore rich in silica, slags, and coals, and smelted for copper. The economical process spoken of under the fourth head is calcining a portion of the first class ore with all of the second and third class, until they are free from sulphur. Any sublimed sulphur is made " to pass while in a state of gas direct from the calcining furnace " into the flue on the top of the kilns; when coming in contact " with the hot air of the kins, it is readily converted into sulphur- " ous acid." The mixed gases are next passed through the nitre oven, and into condensing chambers where they come in contact with steam; they are converted into sulphuric acid. When sulphuric acid of greater purity is required, the gases after passing through the nitre oven are passed into "a dry chamber or " chambers" before passing into the vitriol chamber.

[Printed, 6*d*. No Drawings.]

A.D. 1853, January 11.—N° 74.

COTTRILL, Thomas.—" Improvements in the manufacture of " certain salts of soda." These are, adding to the solution of the black, ash balls, "native carbonate of iron (proto-carbonate), " finely powdered," so as to decompose the sulphuret; carbonate of soda is in solution, and is obtained by evaporation, or by furnacing to " convert it into ash."

[Printed, 4d. No Drawings.]

A.D. 1853, January 12.—Nº 81.

NATION, WILLIAM BRYER, and DYER, JOSEPH.—(*Provisional protection only.*)—"An improvement or improvements in the " manufacture of soap." These are said to be " in the prepara- " tion of an alkaline solution from which soap can be more quickly " made than by the ordinary method," as follows:—One part of slaked lime is " passed through a sieve of about 80 meshes to the " inch," and the said lime is added "to four parts of water to " which four parts crystallized carbonate of soda or carbonate of " potash have been added," and " the mixture is boiled for about " four hours" and cooled, when it may be used. After boiling the lime is sometimes removed on a filter, in which case four parts more of water are added "to the said lime, and after boiling and " filtering add the two liquors together, and concentrate them " until the specific gravity is about 1·25, when the liquor may " be used."

[Printed, 4*d.* No Drawing.]

A.D. 1853, January 13.—Nº 90.

CARTWRIGHT, MOSES.—"An improvement or improvements " in the preparation or manufacture of gypsum or plaster of " Paris." This consists in "the application of heat to the mineral " in a finely powdered state, the said powdered mineral being " stirred during the said application of heat." By this process " of boiling the water contained in the sulphate of lime, as it " is found in nature, is volatilized, and the mineral is brought " into an anhydrous state." This is effected in a circular cistern heated at the bottom by means of a fire, the heat passing along the same by means of a curved flue; the cistern may either be closed or partially closed at the top; a vertical shaft passes through the cover or top of the cistern, which works in bearings, and carries at its lower end horizontal arms of any desired number, to which are attached a series of scrapers or stirrers; rotatory motion is communicated to the shaft from any convenient driving power by means of a toothed wheel attached to the top of the vertical shaft.

[Printed, 6d. Drawing.]

A.D. 1853, January 15.—N° 106.

VION, Hippolyte Charles.—" Certain improvements in appa-" ratus for refrigerating." These consist " in the production of " cold, and is based upon the evaporation of liquids and more " particularly of liquified gases. The latent heat absorbed by " the liquids in evaporating is employed without preference " to any particular liquefied gas or liquid, but according to " the effects it may be desired to produce." The apparatus consists "of a suction and forcing pump," "entirely immersed " in a tub of cold water, cooling the interior and exterior of the " cylinder;" two vessels called "recepients" for the liquified gas are "placed alternately in communication with the suction " and compressing valves of the pump by two pipes," and by a series of cocks two vessels "in which the substances to be operated " upon" are attached to the recipients. This principle is to be applied, among a number of other things, to the precipitation of various salts and the concentration of various acids.

[Printed, 1s. 6d. Drawings.]

A.D. 1853, January 24.—N° 174.

KNAB, David Clovis.—" Improvements in the process of and " apparatus for distilling certain vegetable and mineral matters, " and also animal bones and flesh." These are, distilling the above substances by means of metal baths "at a temperature " suitable to the nature of the operation, and at a lower degree " than hitherto practicable;" also the apparatus used. A table is given of the temperatures of the melting point of some metals and of some mixtures of metals, and it is stated that " for obtain-" ing the purest quality of volatile products, videlicet, acetic acid, " and spirit of wood, and a large quantity of charcoal as a residue, " the bath for distilling the wood should be composed of ten parts " of lead and four parts tin, and the heat be raised to 470° F."

[Printed, 8d. Drawings.]

A.D. 1853, February 2.—N° 283.

BELLFORD, Auguste Edouard Loradoux.—(*A communication.*)—" Improvements in furnaces and apparatus combined there-" with for making wrought iron directly from the ore, and for " collecting and condensing the oxydes or other substances evapo-

" rated in the process of deoxydising iron or other ores." These are, in reference to this subject, first, "a single or double deoxi-" dizing tube or series of deoxidizing tubes," with a "centre or " side space or series of tubes," "to receive and collect or conduct " away the oxydes from the ores in the deoxydizing tube or tubes " through suitable openings" for "the purpose of manufacturing " sublimate (oxides of zinc) or metallic zinc or other substances." Second, a hood or cover "furnished with suitable openings, and " placed over the tubes or spaces" for "the purpose of receiving, " leading off, and cooling the oxydes escaping from the ores " during the deoxidizing process."

" This part of the invention is particularly applicable to iron " ores in which zinc is found mixed in considerable quantities."

A pudling, reverberatory, or other furnace having two hearths is described, attached to which is what is called a stack at the end furthest from the fire; this stack contains a series of, in preference, flat vertical tubes in which the ore is deoxidized. These tubes are connected together at top by a plate which forms the bottom of a feeding trough, "from which the ore is supplied to the tubes;" at the bottom the tubes are connected together by another plate, which forms the top of what is called the ore box, for the reception of the ore after it leaves the tubes. The box has spouts provided with sliding shutters, which spouts deliver the ore when required on what is called "the preparatory bottom." There are arrangements by which the ore when deoxidized is discharged from the tubes into the ore box. The deoxidized ore is worked on the preparatory bottom and forwarded to the pudling bottom and balled up.

Third, employing "for the purpose of constructing the deoxy-" dizing tubes," &c., self-binding and cross-binding fire-bricks, having arrangements of tongues and grooves.

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1853, February 5.—Nº 321.

WERCKSHAGEN, Charles Frédéric.—" Certain improve-" ments in the manufacture of carbonate of soda and potash." These are, " sulphuret of sodium is prepared by the reduction of " the sulphate of soda by pounded charcoal;" the sulphuret is mixed with bicarbonate of soda and water in equivalent proportions, and heated gradually in a close vessel up to 160° centigrade and the mass is dissolved, &c. When sulphuretted hydrogen is "evolved, it is decomposed by the action of sulphurous acid and "water steam;" the sulphur thus liberated "does not separate "from the water." To get the sulphur, the whole is dried by a chloride of calcium bath, "but it is simpler and more advantageous to bring directly the sulphuretted hydrogen into the "sulphur furnace," and convert it into sulphuric acid in the leaden chamber. Bicarbonate of soda is made by passing carbonic acid of a furnace, deprived of smoke and sulphurous acid by means of a washing apparatus, into a solution of the carbonate. "The transformation of the sulphate of potash into carbonate of "potash is also possible by this process with restitution of the "sulphur."

[Printed, 8*d.* Drawing.]

A.D. 1853, February 12.—N° 374.

BURSILL, George Henry.—"Improvements in operating "upon auriferous quartz, clays, and other minerals, preparatory to "and in order to accomplish the separation of the gold and other "metals; also in machinery or apparatus for effecting such improvements." These are, in reference to this subject, as follows: —In carrying out the above objects, a caustic ley is employed "for "suddenly cooling, and so causing to be disintegrated the auriferous quartz or other metal-bearing mineral, the hardness of "which is traceable to the existence of silica, or to any substance "having when hot a known affinity for caustic soda or potash," and which ley "by its subsequent purification," it is enabled to be employed "over and over again for disintegrating purposes," by the following treatment: "when the ley has become nearly "saturated with silica, or with other impurities, as to be unfitted "for further use," causing "it to be purified, either by the use "of carbonic acid gas, and the subsequent addition of lime that "has only been recently slacked, or by any other suitable "means."

[Printed, 6*d.* No Drawings.]

A.D. 1853, February 15.—N° 387.

CLARK, William.—(*A communication.*)—"Improvements in "the manufacture of colors and paints."

These are, first, in making dark chrome, dissolving 112 lbs.

bichromate of potash in a copper, and when boiling, pouring into it 35 gallons of water in which 70 lbs. of oxide of zinc has been thoroughly mixed, boiling the whole during an hour with stirring; the supernatant liquid is drawn off, and the chrome washed and dried. When chromes of a lighter shade are required, it is necessary to use a greater proportion of oxide of zinc.

Second, for manufacturing "citron or lemon colour pigments," the liquors and washings are evaporated "till the sp. gr. is 26° "by the ordinary acid hydrometer," and "for every 8 gallons of "the liquor so reduced, dissolve 40 lbs. of oxide of zinc in 24 lbs. "sulphuric acid," and mix and boil the whole together for the space of an hour; the supernatant liquid is drawn off, and the colour washed and dried.

Third. Cadmium yellow is made by adding to a ½ lb. of metallic cadmium in small pieces placed in a capsula, with a pint of water on a sand bath, little by little nitric acid, about 7 ozs.; the solution thus obtained, diluted with a large quantity of water, is saturated with sulphuretted hydrogen, obtained by decomposing sulphuret of iron with sulphuric acid, and the precipitate collected, washed, and dried. "For cadmium yellow of a lighter shade, a "small quantity of oxide of zinc" dissolved in sulphuric acid is mixed with the dilute solution before precipitating by the sulphuretted hydrogen.

Fourth. Making "red and orange colours," by dissolving "1 lb. of sulphur of antimony" in a quart of muriatic acid, diluting the solution and saturating it with sulphuretted hydrogen; the supernatant liquid is decanted, and the colour is dried. "The colour so produced will be a bright red, and by the mix- "ture of certain proportions of oxide of zinc therewith, the "various shades of orange may be produced."

Fifth. To produce blues, metallic cobalt is dissolved in a similar manner to the cadmium, under the third head, oxide of zinc is added, and the whole calcined in a furnace.

Sixth. To produce green colours, oxide of cobalt is dissolved in sulphuric acid, and the solution evaporated to dryness, and the residue heated until it becomes of a redish hue, and finally all the acid is evaporated, the residue is dissolved in a large quantity of water and mixed with oxide of zinc; the mixture is distilled in a retort to expel moisture, gradually raising the temperature until the desired result is obtained. The furnace required is described. "This process is watched and tested by withdrawing

" a portion of the contents of the retort from time to time, and " when it arrives at the proper shade of color, the operation is " suspended, and the contents of the retort removed."

[Printed, 8*d*. Drawing.]

A.D. 1853, February 19.—N° 433.

COWPER, Charles.—(*A communication.*)—(*Letters Patent void for want of Final Specification.*)—" Improvements in the manufac- " ture of oxide of zinc or zinc white, and in apparatus for that " purpose." These are, a furnace in which are a series of retorts, placed in an inclined position, and " with apertures near their " mouths for the admission of air, and also with other apertures " or passages through which the oxide of zinc passes into a " chamber, from which another passage or flue leads to one or " more condensing chambers." The retorts are charged with metallic zinc, or zinc ores with carbonaceous matters.

[Printed, 4*d*. No Drawings.]

A.D. 1853, February 25.—N° 479.

RICHARDSON, Thomas.—(*Provisional protection only.*)— " Improvements in the manufacture of certain compounds of " phosphoric acid." These are, " employing any inorganic phos- " phate, the chlorides of sodium or potassium together or alone, " with such a quantity of sulphuric acid as will at least convert " a portion of the phosphoric acid into a soluble phosphate of the " alkali; or bisulphate of soda or potash, instead of the chlorides " of the alkalies and sulphuric acid for the same purpose, or " phosphoric acid in a soluble form free or combined with a " chloride or sulphate of the alkalies."

[Printed, 4*d*. No Drawings.]

A.D. 1853, March 3.—N° 529.

MURDOCH, James.—(*A communication.*)—(*Provisional protection only.*) — " An improved process for the manufacture of " iodine." This consists as follows :—" The mother waters ob- " tained in the purification of native nitrate of soda " are " mixed with chloride of potassium," and a slight excess of carbonate of potash or soda added which precipitates " the " carbonates of lime and magnesia." To the decanted liquid sulphuric acid is added; this precipitates " chloride of iodine " with *great excess of iodine*," which is " filtered upon cloths," and saturated with caustic potash. "The liquid obtained is "evaporated to dryness in a cast-iron vessel, charcoal in "powder being added from time to time." The salt is then fused, cooled, treated with water, and the liquor decomposed by an excess of sulphuric acid with the addition of "a small "quantity of peroxide of manganese to determine the decomposition of the last traces of hydriodic acid." The iodine is "collected, dried, and, if requisite, sublimed a second time."

[Printed, 4*d*. No Drawings.]

A.D. 1853, March 8.—N° 587.

EMERSON, Frederick William.—"Improvements in ob"taining tin from ores." These are said to be, "purifying and "separating the ores of tin by acting upon the contained impu"rities with a mixture of sulphuric acid and chloride of sodium "(common salt) either with or without the addition of nitrate of "potash or soda, with or without the application of heat, by any "known means." To effect this a correct analysis of the ore is first made, and if found to contain sulphur or arsenic it is roasted or calcined; if found to contain oxide of tin the bulk of the ore is saturated with nitric or nitrous acid, and after two or three hours the whole is distilled and the nitric or nitrous acid received into condensers. The ore is then mixed "with such a "quantity of common salt as shall yield a sufficient quantity of "muriatic acid by decomposition with sulphuric acid, as will com"bine with the contained impurities of metallic oxides." Steam is turned into the mixture, "adding a small quantity, say, 6 to 7 lbs. "to the ton of ore, of nitrate of soda or potash, for the purpose of "enlivening and quickening the operation." In some cases the nitrates are increased. When the conversion is complete the supernatant liquor is "drawn off, and the resulting metallic "chlorides, sulphates, and nitrates washed out from the tin ore" by water. "In the event of contained tungstates," the tungstic acid would be in a pulverulent state, and may be washed out or brought into the shape of an alkaline tungstate by digestion in solution of carbonate of soda, or potash, or ammonia, caustic soda, or potash, or ammonia, or by fusion with an alkali.

[Printed, 4*d*. No Drawings.]

A.D. 1853, March 14.—N° 634.

STAITE, William Edwards.—"Improvements in apparatus "*for producing* and applying current electricity, parts of which "apparatus are applicable for obtaining and treating certain "chemical products resulting from electrolytic action." These are, in reference to this subject, "using alloys of lead to form the "positive elements of galvanic batteries;" the metals for alloying, "in an electrical sense, are more positive than lead." The metals preferred are "antimony, zinc, or tin;" the proportions in which they are preferred to be alloyed are given. "The exciting solution "preferred is dilute nitric acid," say, "one part of acid to two "parts of water." "The metals composing the electro-positive "plates are oxydized, and where tin is employed with lead the "result is," "part of the lead is precipitated, and part held in "solution as nitrate of lead, the tin being deposited as an oxide." The solution separated may be crystallized for nitrate of lead, or it may be decomposed by carbonate of potash or soda; carbonate of lead is precipitated, and a nitrate of the alkali is in solution and is obtained by evaporation. "The precipitates, consisting of car-"bonate of lead and oxide of tin," when mixed "yield a valuable "white pigment," and from which colored pigments may be produced, as, for instance, by adding chromate of potash in solution to the precipitate "any shade of chrome yellow may be obtained."

[Printed, 10*d*. Drawings.]

A.D. 1853, March 16.—N° 655.

OLIVER, John.—"Improvements in the manufacture of a red "pigment, commonly called Venetian red." These are, "decom-"posing a solution of chloride of iron by calcined magnesian "limestone;" also "decomposing the chloride of magnesium in "the supernatant solution of chloride of calcium and magnesium "by means of calcined magnesian limestone, forming a solution of "chloride of calcium and precipitating hydrate of magnesia." Also, "decomposing a solution of sulphate of iron by means of "the hydrate of magnesia obtained as described," the "oxide of "iron precipitated is obtained, and sulphate of magnesia in solu-"tion." Also, "decomposing a solution of sulphate of iron by "a solution of chloride of barium," thus obtaining "precipitated "sulphate of baryta, and chloride of iron in solution."

The precipitated oxide of iron is separated from the supernatant liquid, washed thoroughly, and to one part by weight of iron present in the oxide is added three to four parts of calcined gypsum in powder, according to the colour required, and the whole ground with water for ten or twelve hours, when it is run into settlers; on subsiding the water is run off, the mass dried and calcined in a retort closed from the fire, at the same time allowing " the free admission of air upon the incandescent mass."

[Printed, 4*d*. No Drawings.]

A.D. 1853, March 26.—N° 731.

ROBB, George —" Improvements in the manufacture of sul-" phuric acid, alkalis, and their salts." These are, first, " in " making sulphuric acid, sulphurous acid from burning pyrites is " passed over peroxide of iron, in preference resulting from the " combustion of iron pyrites, in a state of powder heated to dull " red in a furnace or kiln," air being at the same time admitted at the bottom of the pyrites kiln; " the resultant combination " forms sulphuric acid."

Second, " making sulphate of soda by passing the vapour of " sulphurous acid over peroxide of iron and common salt mixed " together, and kept at a dull red heat," preferring to use the peroxide of iron as above described.

Third, mixing " the ordinary materials for the production of " sulphuret of sodium with sulphuret of calcium or soda waste," decomposing the sulphuret of sodium by carbonic acid so as to form carbonate of soda.

[Printed, 4*d*, No Drawings.]

A.D. 1853, March 28.—N° 741.

DERING, George Edward.—" Improvements in the manu-" facture of certain salts and oxides of metals." These are, first, preparing salts of metals by evaporating to crystallization or to dryness solutions from " batteries, the action of which has been " stopped prior to the liquid becoming saturated with the metal;" also, " from solutions derived from the construction known as " percolating batteries." The first-mentioned solutions may be further saturated before evaporating by adding metal, in preference, " the scraps of electically positive metals which accumu-" late when batteries are worked upon a large scale," advisably associated " with some negative element," " such as charcoal or " graphite." Another way of obtaining saturated solutions from percolating and other batteries is to have the cells deep, and with *taps* at the bottom, or with syphons reaching to the bottom, " regulating the supply of fresh exciting liquid."

Second. In " batteries which have a porous division between " the positive and negative elements," placing " some suitable " acid in contact with the negative element, either pure or diluted," and " either a very weak acid solution, or a solution of some " suitable salt or pure water," in " contact with the positive " element." " So soon as the liquid in contact with the positive " element has become impregnated with the metal it may be " removed and fresh liquid substituted." This arrangement of battery, it is stated, also possesses " considerable power with very " great constancy." " For exciting the negative elements of " certain kinds of batteries, especially " a Grove's and the Maynooth, using " a mixture of sulphuric acid and nitrate of soda." " In batteries having only one exciting liquid employing porous " divisions between the positive and negative elements."

Third. Making carbonate of zinc " from the refuse solutions " containing the metal," by adding " to the solution either " carbonate of potash or carbonate of soda in a state of solution, " or otherwise; carbonate of zinc is precipitated with a portion of " hydrate, leaving solutions of soda or potash, which also may be " applied to useful purposes." Oxide of zinc is made by " heating " the carbonate to redness, and the metal itself may be derived by " the usual process of treating the ore of zinc, known as calamine." Sulphuret of zinc is made by heating the sulphate produced as above " in a closed crucible, with charcoal," or by treating the refuse results under consideration with sulphuretted hydrogen, or with sulphuret of ammonium, " leaving solutions " of ammonia or of acid." " Oxide of zinc may be derived from " the sulphuret by roasting it in the air; the metal itself is " derived from the sulphuret by the usual process for treating " blende. Sulphuret of lead is obtained from the solutions of " that metal by processes similar to the above, and the metal " itself is derived from it by the usual process for treating galena. " Carbonate of lead is obtained by adding carbonate of soda to " the solutions." The salts of tin and of iron are derived from the refuse solutions by methods similar to the above. Another method for preparing oxides of " zinc, lead, tin, or iron is to add " either ammonia or caustic alkalies to the refuse solutions." The hydrate is thrown down, " leaving solutions which may be " applied to various useful purposes."

[Printed, 6*d*. No Drawings.]

A.D. 1853, March 31.—N° 770.

AYMARD, William Augustus Pascal.—(*A communication from P. J. Solomon.*) — (*Provisional protection only.*) — "Certain improvements in applying to illuminating the extract "of bituminous products of coal, peat, and lignites, and "in rectifying and epurating the essences and greasy matter "from coal." These are, in reference to this subject, in rectifying "the raw oil obtained by the first process of distillation of "coal or coal tar (either pure or mixed);" it is distilled "by "means of stills covered with lids open at top, or upon a solution "of aluminous or argillaceous earth, purified in an alkali or soda "wash obtained from quicklime. By separating the product of "this second distillation with diluted sulphuric acid," "crystallized alums" are obtained, from which by washing all the bituminous products are separated.

[Printed, 4*d.* No Drawings.]

A.D. 1853, April 2.—N° 788.

ROBB, George.—"Improvements in the manufacture of sul"phuric acid, alkalis, and their salts." These are, first, in making sulphuric acid, "employing oxide of iron" (obtained by calcining iron pyrites) and oxide of manganese, both reduced to a coarse powder, mixed with clay or argillaceous earth, or alumina, preferring also "to mix a quantity of ground coke, or charcoal, or "small coal in the mass," and made into bricks and dried until they are hard. In this state they are put into an ordinary limekiln round which "are ranged a set of pyrites burners," so arranged that all the products pass into the kiln. Common pyrites is roasted in the burners, and heated air is admitted at the same "time at the bottom of the composition kiln;" the result is, the formation of sulphuric acid. "During this process carbonic "oxide or other cheap combustible gas may be advantageously "introduced into the kiln;" also, "surcharged or superheated "steam." "Sulphur, sulphuretted hydrogen, or artificial sul"phuret of iron," is also used as a source of sulphurous acid."

Second. In making sulphate of soda, decomposing "common "salt in a state of admixture with oxide of iron, pyrites, cinder, "or oxide of manganese (made up into balls or bricks with clay "or alumina) by passing the vapour of sulphurous acid through "such compound," heated in a kiln. With steam admitted, hydrochloric acid is evolved; without steam, and the materials being "dry, chlorine gas is evolved."

Third. In making carbonate of soda. The sulphuret of sodium is formed by decomposing by heat the sulphate of soda mixed with a portion of the sulphuret or sulphate of baryta, strontia, lime or magnesia, or their mixtures, or vat waste and carbonaceous matters; on lixiviating the mass sulphuret of sodium is in solution, "and the residue may be continuously used over and over" again. The sulphuret of sodium thus produced may be decomposed by the action of bicarbonate of soda, according to N° 8399. But the bicarbonate of soda is especially used "as a source of "carbonic acid for effecting the decomposition of the sulphuret" by placing it "in a separate vessel or chamber, and generating "the carbonic acid by the agency of heat." "The bicarbonate "of soda may be produced by causing the common carbonate of "soda to absorb the products of the combustion of carbonaceous "materials freed from sulphuretted hydrogen, which is turned "into sulphurous acid or sulphur."

[Printed, 4*d*. No Drawings.

A.D. 1853, April 4.—N° 803.

STEIGEWALD, Francis.—(*Letters Patent void for want of Final Specification.*)—"Improvements in the manufacture of glass "and porcelain." These are, cleansing flint, spar, quartz, and other similar materials from metals, by causing them, "after "being reduced to powder and dried, to be made up in heaps of "about a ton on a wood floor," and sprinkling on every heap from 5 to 6 lbs. of concentrated muriatic acid, turning the heap over during the process. The "turning is to be repeated daily "for some days till the mass becomes of a yellow color; the "materials (silica) are then to be well washed with water and "dried, when they will be ready for use."

[Printed, 4*d*. No Drawings.]

A.D. 1853, April 5.—N° 811.

STANLEY, Edmond Stanley.—(*A communication.*)—(*Provisional protection only.*)—"Improvement in the manufacture of "soda-ash or carbonate of soda from common salt." This consists in "decomposing common salt by means of the joint "action of certain metallic substances and water." In the amended Provisional Specification it is stated, to obtain caustic soda "the salt is dissolved in water, and the solution is placed " between two different metals connected together. Iron and " copper would be the metals employed, as being the cheapest," and a porous diaphragm is placed between them; chloride of iron is formed, " the salt solution being on the side where the iron is, " and clean water to receive the soda on the side where the copper " is." There are certain conditions necessary to ensure the decomposition of the salt; these are specified.

[Printed, 4*d*. No Drawings.]

A.D. 1853, April 13.—Nº 887.

ELLIOT, George, and RUSSELL, William.—"Improve- " ments in the manufacture of alkali." These are, "the manu- " facture of black ash, and also the drying or finishing of soda " ash by means of revolving cylinders." These cylinders are of cast iron, lined with brick, having two ribs cast upon them resting in the grooves on four wheels or pulleys, two of which are placed nearer the centre of suspension than the other two, and are connected by a shaft "which is turned by a steam engine or other " prime mover. By this means the cylinder is made to revolve " when required," the wheels " which have no connecting shaft " merely revolving by the friction of the ribs on their grooved " circumferences." Attached to the cylinder is a furnace from which a flue leads into the cylinder, and there is a pipe or flue from the opposite end of the cylinder into the chimney; there are doors for charging and discharging the materials; there is "a " central pipe or tube extending the whole length of the cylinder, " through which the flames from the furnace may pass instead of " their going into the cylinder," as in the finishing process. The cylinder may be heated externally.

In the Provisional Specification it is stated that "where an " impure salt cake is made by subjecting salt and pyrites to heat," the " revolving cylinders may be advantageously fitted with a " worm."

[Printed, 10*d*. Drawings.]

A.D. 1853, April 14.—Nº 912.

ZENNER, David.—"Improvements in the treatment of ores " and other substances containing metals to obtain products

" therefrom, and the apparatus used therein." These are, first, in retort furnaces, employing "an upright retort of conical or " pyramidical shape heated on the outside by means of flues, " and the application of this retort furnace to metallurgical and " other chemical operations." The ores are fed in by a hopper " at the top, and gradually moving downwards are, when suffi- " ciently heated, discharged through an opening near the bottom " of the retort." By this operation the ores are converted into " sulphurets or sulphides." When there is an insufficiency of " sulphur it is supplied by means capable of rendering it."

Second, " the manufacture of green copperas or other salts of " iron by dissolving protosulphuret of iron in diluted sulphuric " acid or any other acid." The solutions of the salts are crystallized or otherwise made use of.

Third, " the concentration and separation of precious or valu- " able metals obtained in or combined with pyritical ores or " protosulphuret of iron." This is effected by leaving undissolved in the acid some of the ore; and when an excess of acid has been used adding some sulphuret of iron, either in the dry or in the hydrated state, or on adding " the sulphurets of an alkali or an " alkaline earth " the valuable metals precipitate.

Fourth, the " precipitation and separation of precious or valu- " able metals from non-sulphurized ores or matters, and from " solutions by means of protosulphuret of iron or hydrated " protosulphuret of iron." When the substance after roasting is dissolved in an acid a stream of sulphuretted hydrogen is passed through it, and sulphuret of iron added " proportionate to " the valuable metals which are to be precipitated;" or a partial precipitate is obtained by adding the " sulphide of an alkali or an " alkaline earth;" this precipitate contains all the valuable metals besides some of the iron, and is treated with dilute acids as above.

Fifth, " the use of protosulphuret of iron instead of metallic " iron in the manufacture of copperas."

[Printed, 8*d*. Drawing.]

A.D. 1853, April 16.—N° 924.

SOUCHON, JEAN MARIE.—" Improvements in the manufacture " and purification of gas for illumination and certain products " therefrom, and in apparatus for that purpose." These are, in reference to this subject, first, "increasing the quantity of gas " and obtaining cyanides by passing the products of the distil- " lation of coal through a heated retort containing alkali or " alkaline salts." The retort has a shaft through it, upon which are mounted two perforated discs, and between these are two agitators. The shaft has a square socket "at the end next the " mouth of the retort, into which enters a spindle mounted on the " door" of the retort. "This spindle is caused to revolve by " means of a wheel and pinion" driven by a handle. The retort is charged between the discs with a fixed alkali or suitable alkaline salt, such as potash or soda, or their carbonates or sulphates, or with "coke or charcoal or other porous, carbonaceous, or organic " matter impregnated with such alkaline substances." "From " six to ten coal gas retorts are connected to one cyanide " retort."

Second, obtaining illuminating gas and cyanides by injecting a mixture of tar and ammoniacal liquor into a heated retort, and conveying the vapours or gases so produced through a heated retort containing alkali or alkaline salts, or filled as above, and in the manner above described.

[Printed, 8*d*. Drawing.]

A.D. 1853, April 19.—N° 945.

BÖHRINGER, Christian, and **CLEMM**, Gustavus.—"Im- " provements in the manufacture of soda and potash." These are "the conversion of sulphurets of sodium and potassium into " carbonates of the respective bases by treatment with bicarbo- " nates of the respective bases." Sulphate of soda or of potash and carbon are mixed together "in proper proportions," and decomposed in a reverberatory furnace, and the sulphurets thus obtained are dissolved and excess of "bicarbonate of the respective " salt" added and heat applied, with stirring, until the mass is dry. The sulphuretted hydrogen evolved is conducted "into " apparatus to effect its reduction into sulphur or its combustion " into sulphurous acid."

[Printed, 4*d*. No Drawings.]

A.D. 1853, April 26.—N° 998.

GEYELIN, George Kennedy. — "Improvements in the " *manufacture of* white oxide of zinc." These are, first, "a "novel form of retort used in the process of sublimation of "zinc" for the above purpose. The retorts are shallow with flat bottoms, their depth is "about one-half their breadth," or less.

Second, arranging retorts for the above purposes so that the heat must not pass between them, but must pass under and over them, or vice versa.

Third, admitting jets of steam or vapours into the retorts to facilitate the oxidation. This is effected by a pipe with a stopcock into each retort. In place of the vapour of water other vapours, "as the oxide of manganese or barytes, which when "heated freely give off oxygen, may be employed."

Fourth, in furnaces for the above purpose, having a charge chamber for coals above the furnace, with a sliding plate on which the coals rest, by withdrawing which the coals fall into the furnace.

[Printed, *6d.* Drawing.]

A.D. 1853, May 6.—N° 1115.

BRACKENBURY, Augustus.—"Improvements in precipitating the muriate of soda from its solutions." These are, "in "the direct application of air or gas to such solutions." "Several modes of operation may be pursued;" one mode is to float a disc of wood on the surface of the solution, the disc nearly covering the surface, having a hole in the centre over which an inverted chamber is placed. "This chamber is rendered "close above the disc, the only ingress or egress being from "below the disc or float." "A tube rises up from the bottom of "the tank or containing vessel into the inverted chamber," such tube being at all times above the surface of the solution; heated air forced through this tube into the inverted chamber causes "the disc or floating surface to rise, and the fluid in the chamber "to be depressed, until the air escapes below the disc," causing the liquid to be evaporated.

Another mode is to erect over a vessel containing the solution to be evaporated, "a drum having its axis horizontal, and in such "elevation that the periphery of the drum dips slightly into the "brine below." The sides of the drum are enclosed with woollen or cotton cloth, "with the exception of an aperture in the "centre *on one side.*" The air heated "is forced into the drum

" with a slight pressure, the drum having at the same time a slow " rotatory motion imparted to it while dipping in the brine." The air passes through the cloth charged with aqueous vapour. " In- " stead of introducing the heated medium into the drum," " the " heat may be generated in the drum by the combustion of gas," air being forced in " under a slight pressure by means of a fan or " other apparatus " to support combustion.

[Printed, 4*d*. No Drawings.]

A.D. 1853, May 6.—Nº 1122.

LONGMAID, WILLIAM, and LONGMAID, JOHN.—" Improve- " ments in treating waste products obtained in smelting, and " otherwise treating ores and minerals, and in producing a " valuable product or products therefrom." These are, in reference to this subject, when " oxide of iron and alkali waste mixed " with carbon are smelted, and one of the products consists of " iron, copper, silver (when these metals exist in the ores), and " sulphur, this product may be used for various purposes, par- " ticularly for decomposing common salt in the manufacture of " alkali."

The rest of this invention consists in fusing slags and certain waste products in alkali making, consisting " for the most part of " oxide of iron, silica, and compounds of lime, together with " small quantities of copper and silver," and then mixing them with fluxes when required and making them into suitable forms, " these articles are subjected " to heat, and then to gradual " cooling in the ordinary manner of annealing."

[Printed, 4*d*. No Drawings.]

A.D. 1853, May 14.—Nº 1193.

HIGGIN, JAMES. — " Improvements in printing or dyeing " woven or textile fabrics, and in the manufacturing of certain " substances to be used in the arts or processes of dyeing and " printing." These are said to be " the use of a silicate of an " alkaline earth diffused in water in place of cow-dung in the " dunging operation." In carrying out this a mixture of sand and soda ash or carbonate of soda, " as nearly as possible a com- " bination of two equivalents of silica and one of soda," are fused in a reverberatory furnace and a solution made, say, 50° Twaddell (the preparation of this silicate of soda is disclaimed). *This solution, together* with an excess of a solution of muriate of lime, are added to hot water in the dunging bath; "bisilicate of "lime" is formed, "which separates as a precipitate and muriate "of soda remains in solution." The goods are passed through this mixture. "When there is a use for caustic soda, the silicate "of lime may be conveniently and cheaply formed by adding "slaked lime in fine powder to a solution of silicate of soda, "stirring it well." "When settled and clear the soda is run off, "and the silicate of lime washed free from soda. In this state "it can be used in dunging by adding it to the dunging cistern "in any convenient proportions." Silicates of lime may also be formed in a variety of ways.

[Printed, 4*d*. No Drawings.]

A.D. 1853, May 16.—N° 1208.

RICHARDSON, THOMAS.—"Improvements in the manufacture "of certain compounds containing phosphoric acid." These are, first, "manufacturing a compound of phosphoric and sulphuric "acids with lime and soda or potash," by reducing "apotite, "coprolites, bone, ashes," &c., to powder, estimating the phosphoric acid in the same, and according to the amount of same, adding muriate of potash or of soda, and calcining them in preference in "the pan furnace employed in alkali works for decom-"posing common salt by sulphuric acid," along with as much sulphuric as will combine with all the basic constituents so as to liberate phosphoric acid; when acid fumes cease to be evolved the mass is dried at a moderate heat.

Second, "decomposing alkaline salts by phosphoric acid in a "reverberatory furnace, or in apparatus suitably arranged for "retaining the acid liberated from such salts during such decom-"position." "Muriatic or sulphuric acid may be collected by "any of the methods now in use for that purpose." In treating nitrate of soda or potash, "the apparatus at present in use in "making nitric acid" is employed.

Third, "obtaining a purified phosphate of lime and magnesia "from an impure phosphate" by dissolving out the phosphate "with as little muriatic acid as possible," separating the liquid from the undissolved residue, and adding to the liquid "as much "lime or magnesia as is found necessary" to precipitate the phosphate, which is collected and washed with water.

[*Printed, 4d. No Drawings.*]

A.D. 1853, May 18.—N° 1229. (* *)

BARSHAM, John.—Kiln furnace.

To save the heat generated in burning lime or charring peat, and applying it to the generation of steam, a kiln is constructed with an inner iron vesssl set within a casing vessel, having a space left between them. The inner vessel has a slanting floor that the charge may be easily withdrawn, and fire-places are arranged under the kiln in the usual manner. The inner vessel or kiln is charged from above, and its cover dips into a sand joint, and a pipe at the top allows the vapours to escape from the matters in the kiln. The interspace and the space between the top of the inner and outer vessels are filled with water, which, when the kiln is in work, is converted into steam by the heat generated by the combustion of the peat and lime in the inner vessel. The charge may be withdrawn as usual, or be stifled with steam from the interspace.

[Printed, 8*d*. Drawing.]

AD. 1853, May 18.—N° 1232.

GOSSAGE, William.—" Improvements in the manufacture of " alkali from common salt." These are, first, " in oxydizing " 'black ash liquors' by exposing such liquors in a state of " minute division to the action of atmospherical air." It is stated that sulphuret of iron is held in solution in the above liquors by the sulphuret of sodium, but if the sulphuret of sodium is converted into " hyposulphite, or sulphite, or sulphate " of soda, the sulphuret of iron is no longer soluble in such " liquors." This is effected by passing the liquors through a tower filled with small pieces of coke, &c., supported on a grating near the bottom of the tower. The sulphuret of iron is afterwards separated by filtration or subsidence.

Second, " in separating 'ferrocyanide of sodium' from other " compounds of soda contained in 'black ash liquors,' and also " thereby obtaining salts of soda free or nearly free from such " ferrocyanide." The mother liquors, after crystalizing out carbonate of soda, are further concentrated and crystallized, in preference withdrawing " from the concentrating apparatus the " salts produced at different stages of the operation." The salts crystalling out last contain the most ferrocyanide of sodium. *The ferrocyanide* is washed from such salts " by water or by

" solution of carbonate of soda filtering through the same," preferring to do this in a series of vats until sufficiently free from the ferrocyanide " to be suitable for the production of white soda " ash of good quality." The washings are ultimately treated with caustic lime, and the ferrocyanide separated from the caustic soda, by evaporation and crystallization; or instead of causticising the soda, it is converted into bicarbonate by impregnation with carbonic acid. The solution contains the ferrocyanide with a small quantity of carbonate, which is made caustic, and ferrocyanide obtained and recrystallized.

Third, " obtaining 'caustic soda' from 'black ash liquors' by " concentration, and without the use of lime." In preference black ash liquor, freed as above from sulphuret of iron, is treated with " the gradual addition of hypochlorite of lime solution " to convert any hyposulphite into sulphite or sulphate, and concentrated " until the whole or nearly the whole of the carbonate of " soda and ferrocyanide of sodium " are deposited as salts. The solution is caustic soda, and may be evaporated to obtain the the solid hydrate.

Fourth, " effecting the concentration of 'black ash liquors' by " presenting such liquors, in thin sheets or films, to the evaporative action of heated air for the purpose of obtaining caustic " soda therefrom." This is done by passing it over a series of shelves in a tower, each alternate shelf is attached to an opposite end of the tower; the liquid is supplied from above, the heated air is introduced below; when the liquid reaches the bottom of the tower it is conveyed into pans to cool and crystallize. The mother liquor from the crystals is elevated by a pump and again passed through the tower, and this is continued until the liquors are " deprived of a considerable part of the carbonate of soda " previously contained therein."

[Printed, 8*d*. No Drawings.]

A.D. 1853, May 21.—N° 1258.

CHISHOLM, William.—" Improvements in the purification " of coal gas for the purpose of illuminating, and heating, and " obtaining, by the ingredients used therefor, manures, salts of " ammonia, and sulphur." These are, first, purifying " coal gas " by peats, with which they (the ingredients) are found associated " in nature, or peats to which, when deficient in such substances,

" they are artificially supplied ;" for instance, a peat containing a peroxide of iron for depriving gas of its sulphuretted hydrogen, and another peat containing a sulphate of iron or a sulphate of lime for depriving gas of its ammonia. " Where a peat does not " contain a sufficient quantity of the peroxide or sulphate of iron, " the rich peat in these substances is to be mixed with the poor " peat," or by burning some peat and mixing the ashes with other peat in sufficient quantity to obtain the desired strength," or saturating and drying repeatedly peat previously dried, with " the natural solution of iron as it flows from the rock." " Chloride of sodium (common salt) " is mixed " with peat or peat " charcoal to charge the purifier for depriving gas of its ammonia."

Second. " Obtaining salts of ammonia from peats which " have " been so used for the purification of gas, " by washing " out the sulphate of ammonia formed in it from the decomposi-" tion of the ammoniacal salt in the gas with the sulphate of iron " in the peat."

Third. " Producing a manure by combining certain substances " with the residual matters left by the gas after it has passed " through the ammonia purifier. " The substances named are superphosphate of lime, bisulphate of potassa, chloride of sodium, sulphate of magnesia, and peat, and these are to be mixed in certain proportions and put into " the ammonia purifier."

Fourth. " Obtaining of sulphur " by sublimation from the peroxide of iron peat after it has become saturated with sulphur from the gas, which it does after using " a dozen times or more," " when between each using it has been exposed to the air, by " which the sulphuret of iron is decomposed, sulphur liberated, " and the iron peroxidised."

[Printed, 6*d*. No Drawings.]

A.D. 1853, May 28.—N° 1319.

BINKS, CHRISTOPHER.—(*Provisional protection only.*)—" Im-" provements in manufacturing chlorine, and in obtaining certain " salts and other useful products from the residual matters of " such manufacture." These are, first, using as the source of chlorine " chloride of muriate of manganese," a waste product, " instead of chloride of sodium or hydrochloric acid." " To the " equivalent of chloride of manganese adding an equivalent of " *peroxide of manganese* and as much sulphuric acid as requisite," and heating this mixture until "the whole of the chlorine is "evolved." The residue, mixed with a little oxide or carbonate of manganese, is heated until any persulphate of iron is decomposed, and the mass lixiviated; a solution of sulphate of manganese free from iron is obtained, "together with a residue of "peroxide of iron of fine tint."

Second. Using chloride of zinc in the same way as above, the result is chlorine and a double salt, or mixture of sulphate of zinc and sulphate of manganese.

Third. Using chloride of calcium as above, the result is sulphates of lime and manganese together, with some persulphate of iron applicable to several useful purposes; or the mixture is heated, and the sulphate of manganese dissolved out from the sulphate of lime and peroxide of iron. When it is advisable to have more peroxide of iron in the mixture chloride of iron is added to the mixture, or chloride of iron may be used entirely with peroxide of manganese and sulphuric acid.

Fourth. Using chloride of magnesium as above.

Fifth. Using muriate of alumina as above.

[Printed, 4*d*. No Drawings.]

A.D. 1853, June 2.—N° 1359.

BOYD, William.—"Improved apparatus for manufacturing "chlorine or chlorides." This consists in substituting for the "common leaden or stone still," for the above purpose, an iron vessel or still, having a lining of fire-bricks or tiles, previously well boiled in coal-tar, jointed carefully together with a cement composed of ground pipe-clay, ground mineral pitch, fine clean sand, and boiled linseed oil, in certain proportions. "The nozzle "or emptying pipe of the still is protected by means of a square "bushing of burnt fire-clay well boiled in coal tar," perforated "with a circular hole." The still has a "leaden dome-shaped "cover, which is luted down by means of cement in the usual "manner."

[Printed, 4*d*. No Drawings.]

A.D. 1853, June 6.—N° 1386.

CARTER, George, and MARRIOTT, George.—"Improve- "ments in the manufacture of whitelead." These are, the manufacture *of whitelead or* sulphate of lead as follows :—To every 100 lbs. "of fine ground oxide of lead, called litharge," adding "about 25 lbs. of muriate of soda, which must be mixed "and triturated until a muriate of lead is formed." Washing the materials and adding 5 lbs. of the sulphuric acid of commerce, a white sulphate of lead will be the result, which is washed and dried. Or, sometimes taking equal parts of the oxide and peroxide of lead and adding a fourth of muriate of soda in boiling water, grinding well, washing well, afterwards stirring up with sulphuric acid, subsequently washing by decantation, when it is collected, and dried and ground. Or, in place of using sulphuric acid, using alum or a sulphate easily obtainable, "in the propor- "tions equivalent for the composing the muriate of lead, and "thereby obtain sulphate of lead, which is to be washed, dried, "and ground," as before.

[Printed, 4*d*. No Drawing.]

A.D. 1853, June 7.—N° 1399.

McDOUGALL, Alexander.—"Improvements in the manu- "facture of potash and soda ash." These are, "the application "of the refuse lime of gas work as a substitute for the lime or "limestone ordinarily used in such manufacture."

[Printed, 4*d*. No Drawings.]

A.D. 1853, June 14.—N° 1441.

RICHARDSON, Thomas.—"Improvements in the manufacture "of certain salts of magnesia and a red colouring matter." These are, first, "treating impure magnesia, such as results from Ward's "process, or magnesite, or such like mineral, with carbonic acid "and water," in "a large soda water machine;" or the magnesia and water are put into "a wooden box, divided into cells by par- "titions running from the top and bottom alternately," and a stream of carbonic acid is drawn through the whole of the "com- "partments from a furnace filled with coke or charcoal," by "means of a steam jet or air pump worked by suitable machi- "nery." When the solution is saturated, a small quantity of cream of magnesite is gradually added to precipitate iron, &c., and the solution evaporated until the whole of the carbonate of magnesia is precipitated.

Second. "The use of fluor spar and sulphate of iron for making "a red coloring matter, either alone or in connection with the

" preparation of pure sulphate of magnesia." In making pure sulphate, employing " one part of fluor spar for every four parts of " the sulphate of iron or manganese present in the impure " Epsoms, together with the ordinary quantity of magnesia, and " calcine this mixture at a very low temperature." The calcined materials are lixiviated, the pure sulphate is in solution and may be obtained in the usual way; the residue is the oxides of the metals, " a coloring material." " Fluor spar may also be calcined " with the sulphate of iron in the manufacture of Venetian red."

[Printed, 6*d*. Drawing.]

A.D. 1853, June 15.—N° 1455.

GOSSAGE, William.—" Improvements in obtaining certain " saline compounds from solutions containing such compounds." These are, arrangements of apparatus for the above purpose. In evaporating " soda liquors obtained by the lixiviation of black " ash " employing " a series of pans connected together " of which one-half are termed " heating pans " and the others " cooling pans." The heating pan is heated " either by special fires " adapted thereto, or by waste heat conducted from furnaces." The cooling pan is connected with the heating pan by a narrow channel at each end, in the channel communication in the end nearest the furnaces. There " is a paddle wheel, which being " caused to revolve by suitable mechanical means occasions the " liquor contained in the two pans " to circulate from the one into the other. In the cooling pan, there is a vessel which " is " supported about three inches above the bottom of the pan ; " it has a series of notches cut in its lower edge on each side " through " which streams of air pass into the liquor " by " means of a " forcing pump (driven by suitable means) which is connected " with the vessel " by a pipe ; a tap supplies the liquor into the heating pan. In this arrangement, besides separating carbonate of soda from black ash, " sulphate of soda can be obtained from " solution (containing also common salt) of sufficient purity to be " suitable for the manufacture of alkali."

[Printed, 10*d*. Drawings.]

A.D. 1853, June 16.—N° 1470.

GLOVER, Robert Mortimer.—(*Provisional protection only.*) —" Improvements in the production of chlorine, and for the

" manufacture of black oxide of manganese." These are, " heat- " ing the residue left from" the process of making chlorine (chloride of manganese), "in contact with air, so as again to " obtain a black oxide of manganese, which can again be used in " manufacture;" also obtaining "a similar black oxide of manganese by treating some of the salts of manganese in a similar manner.

[Printed, 4*d*. No Drawings.]

A.D. 1853, June 18.—N° 1487.

DE BUSSAC, Jacques Francois Dupont. — (*A communication.*)—" An improved mode of making with iodine and its com- " pounds, in combination with substances containing extractive " principles, various elementary combinations." Either heat together iodine and a solution or watery decoction of the substances containing extractive principles, "as gums, barks, &c., " &c., or iodine with water'" and " the substances containing " extractive principles," until all the iodine disappears, ascertained by starch no longer being blued when brought into contact with the mixture. Instead of heat "it is sufficient to expose " them to the action of the sun or of the light, to obtain their " perfect combination with the iodine, and the transformation of " the iodine into iodohydric acid." Iodohydrates are formed by dissolving an iodide, as an instance, of quinine, "and mix that " solution with the solution or decoction of a substance containing " extractive principles;" or "dissolve separately some sulphate " of quinine, or quinine itself, and mix it with a solution of gums, " &c., add iodine dissolved, or iodohydric acid, and heat the mix- " ture by a bath. By these means, or by slight modifications of " the same, iodohydrates and biniodohydrates" are formed. "All " the medicines in which iodine is necessary, either in its simple " state or combined with other substances" are prepared as above.

[Printed, 6*d*. No Drawings.]

A.D. 1853, June 18.—N° 1490.

SHANKS, James.—" Improvements in the manufacture of " alkali from common salt." These are, " the production of " sulphate of soda (for the purpose of using this for the produc- " tion of alkali) by exposing a mixture of common salt and 'alkali

" 'waste together with small coal (made into balls or masses) to " to the action of atmospheric air and heat in kilns" pyrites kilns preferred. Alkali waste, common salt, and small coal in certain proportions are mixed together, "with sufficient of clay and water " to give the requisite cohesiveness to the mixture."

When an oxide of iron commonly called burned pyrites can be obtained it is preferred to add a quantity of this also.

[Printed, 4*d*. No Drawings.]

A.D. 1853, July 9.—N° 1641.

TOURNIERE, Pierre Auguste, and De MECKENHEIM, Louis Nicolas.—"Improvements in the manufacture of soap " and washing paste, and of the materials used therein." These are, in reference to this subject, first, making a "caustic alkaline " solution of a strength not greater than 24 degrees of Cartier's " areometer" by boiling for half an hour 50 parts of "pulverised " soda" with 100 parts of water, suspending the boiling and adding 25 parts pulverized quicklime, renewing the boiling and continuing it for about two hours with occasional stirring, and adding of "water to supply the quantity carried off by evaporation." After this the whole is allowed to stand for a certain time, and the clear "liquid is then drawn off by a siphon or other " convenient means."

Second. Chloride of sodium or sea salt "is converted into " crystals of soda" as follows :—A saturated solution of salt, or sea water evaporated to saturation, "is placed in a boiler and boiled for " some time. The decomposition of the water is next effected, " either by adding to the solution a mixture of sulphuric acid and " iron filings or pieces of zinc, or by the voltaic pile. During this " process a current of pure hydrogen or hydrogen more or less " carbonated, or the hydrogen may be replaced by a current of " oxyde of carbon," is passed into the solution. "Carbon or coals, " previously dried, may be placed in the boilers. The operation is " continued for some hours." The soda crystals may be obtained by evaporation, or the solution may be converted into caustic soda by the addition of quicklime as above.

[Printed, 6*d*. No Drawings.]

A.D. 1853, July 11.—N° 1647.

CORMACK, William.—(*Provisional protection refused.*)— " Improvements in the manufacture of alkali and chlorine."

These are, "the application of hydrogen, carbonic oxide in con-
" junction with atmospheric air, also carbonic acid, hydrogen, and
" atmospheric air; both of which by the agency of heat, are
" employed" for "the decomposing of common salt, thereby pro-
" ducing alkali and chlorine," as is "afterwards to be described."

[Printed, 4*d*. No Drawings.]

A.D. 1853, July 13.—N° 1666.

RANSOME, Frederick.—"Improvements in the manufacture
" of artificial stone and similar wares." These are, in preventing
" efflorescence in artificial stone. The caustic soda to be employed in making soluble silica (silicate of soda) is purified from any sulphate it may contain by adding to the solution of caustic soda a solution of baryta "till no further precipitate is caused by such addition," and drawing "off the solution of caustic soda from the precipi-
" tate, and employing it" as formerly described in No. 10,360. Although a solution of baryta is preferred, a solution "of a salt
" of baryta may be employed, or any salt of lead may be used in
" a similar manner." The articles of artificial stone "after they
" are well dried are then raised to a bright red heat in a suitable
" muffle or kiln, and are then allowed to cool slowly."

[Printed, 4*d*. No Drawings.]

A.D. 1853, July 14.—N° 1672.

HENDERSON, William.—"Improvements in the construction
" of furnaces for the purpose of obtaining products from ores." These are, first, "the construction of calcining furnaces with the
" arrangement of double arches and corresponding flues and
" dampers, and the method of heating by equal numbers of fires
" at each end of the furnace (such number being more than one),
" by which combination a regular, uniform, and manageable heat
" is applied." The furnace described is one with two working beds or soles, and a drying bed on the top; there are four fires, two at each end.

Second. "The use of such furnaces for the manufacture of sul-
" phuric acid from copper, tin, zinc, and other sulphurous ores
" and reguluses, and for the purposes of calcination generally."

Third. "The means represented and described of obtaining a
" *supply of air heated* to the same degree, or less than the ores
" *in the furnace*." The hot-air pipes all enter the furnace at the

same end, and the sulphurous acid, &c., leave the furnace by the opposite end by one or more pipes or flues." They are made of iron, fire-clay, or other suitable material; " if metal they are pro-" tected from the direct action of the fire by being laid in the " angles of the flues, and covered with small fire-tiles." The charge is passed from the drying plates on the top through pipes into the upper bed or sole, where it is stirred about as usual, and " when about two-fifths of the sulphur, arsenic, &c., have been " expelled," it is passed to and finished in the lower bed.

Fourth. " Manufacturing sulphuric acid by combining two or " more of these furnaces, and working them for that purpose," as described in No. 57, 1853.

The substances obtained are sulphurous, sulphuric, arsenious, and arsenic acids, and the oxides of tin, zinc, lead, antimony.

[Printed, 8*d*. Drawing.]

A.D. 1853, July 25.—N° 1750.

SPIEKER, CHARLES FREDERICK.—" Improvements in gene-" rating and fixing ammonia." The ammonia is " obtained " from the air and the decomposition of water," either " by " means of metallic iron, or the protoxide of manganese or of " iron." If metallic iron is used, the iron scraps are mixed with finely ground aluminous earth, and spread out in thin layers, having previously been moistened with water and some acid, dilute sulphuric or muriatic acid preferred, to the consistence of a thin paste, and exposed freely to the air, but out of the sun. After the mass is dry, it should be again moistened and exposed as before, and this may be repeated. The presence of ammonia is shown by adding to some of the material caustic alkali or lime, and a rod moistened with muriatic acid held over this mixture, fumes of sal-ammoniac appear. Sulphate of iron may also be employed instead of metallic iron, and humic acid in place of sulphuric or muriatic acids, and hydrate or carbonate of lime may be mixed with the aluminous earth. Gypsum, ground shells, corals, fossiliferous limestone, and fossil animal remains, finely ground, are also employed.

[Printed, 4*d*. No Drawings.]

A.D. 1853, July 26.—N° 1759.

LYTE, FARNHAM MAXWELL.—" Improvements in obtaining " iodide of potassium when treating certain metals." These are, forming iodide *of potassium*, by " treating mixed salts with

" certain metals," as an example, nitrate of silver is added to a solution of a soluble iodide and chloride, and iodide of silver is precipitated, there being a slight excess of the soluble iodide in the liquid. " The addition of ammonia facilitates the decomposition; " so also does heating the liquid." " The iodide of silver thus " produced " is converted " into iodide of potassium and metallic " silver, by projecting it when completely desiccated into a crucible containing fused carbonate of potassa." A soluble salt of lead may be substituted for the silver salt. " The periodide of " mercury (a most splendid pigment) is produced by adding the " bichloride of mercury to the mixed salts."

[Printed, 4*d*. No Drawings.]

A.D. 1853, July 28.—Nº 1768.

HERRING, Edward.—" Improvements in the manufacture of " sulphate of quinine." These relate to the complete extraction of quinine from bark without the use of alcohol. The bark in powder is boiled in caustic alkali, pressed, washed, and afterwards boiled in sulphuric acid and water, and the residue boiled with dilute sulphuric acid, a second and a third time, or oftener. " These " after boilings may be reserved for each succeeding portion of " fresh bark," after it has been treated with alkali. The acid liquids evaporated at 120° F. are filtered from flocculent matter, which is treated with dilute sulphuric acid until exhausted. The filtrate and washings are treated with excess of caustic alkali, and the alkaloid drained, pressed, &c., dissolved in dilute sulphuric acid, and crystallized as usual.

Further crystallization may be employed, and the solutions may be decolorised by boiling with pure animal charcoal.

The caustic alkaline solutions in the first part of the process are acidified with hydrochloric acid and filtered, and excess of lime added; the precipitate containing " the alkaloids and free " lime " is gathered, washed, dried, and powdered, and " treated " by benzole," or any solvent of the alkaloids that is not a " solvent of lime." " If by benzole, turpentine, or lard," cold dilute sulphuric acid is added and agitation employed, " benzole, " turpentine, or lard " floats," while the acid water containing the alkaloids sinks; this acid water is treated with caustic alkali, and " the crude alkaloids " are obtained without the application " of heat."

[Printed, 4*d*. No Drawings.]

A.D. 1853, August 11.—N° 1877.

PATTINSON, Hugh Lee.—(*Provisional protection only.*)—"Improvements in the recovery of sulphur from alkali waste." These are, "fusing this alkali waste with a compound of manganese, so as to convert the lime and earthy matter" into a slag, and the whole or a portion of the sulphur and manganese into sulphuret of manganese."

[Printed, 4*d*. No Drawings.]

A.D. 1853, August 16.—N° 1919.

HUNT, William.—"Certain improvements in manufacturing "sulphuric acid." These are first, "heating the gases in their "passage from the furnace to the condenser by means of the spare "or waste heat of the furnace, or the spare or waste heat of coke "ovens or other furnaces, so that the said gases may be made to "combine with avidity and produce sulphuric acid." "The sulphurous acid gas and atmospheric air" pass through a hot chamber or flue "made nearly red hot," "and if thought desirable "filled with pebbles or pumice stone, or any other material that "will resist the action of heat and acid," and heated as above. The sulphuric acid gas is carried forward with some sulphurous acid into the vitriol chamber. The sulphurous acid unconverted is oxidated there by nitrous gas. Sometimes the "gases are carried direct from the furnace into the flue from the coke ovens" so as to dispense with a separate flue.

Second, "the use and application of nitrosulphuric acid or any "other similar or analogous compound, for absorbing sulphurous acid," as follows, causing "sulphurous acid gas and "atmospheric air to percolate through a tower or column supplied "with coke moistened with strong nitrosulphuric acid," percolating through in the opposite direction.

Third, "separating arsenic from sulphuric acid by means of "sulphuretted hydrogen," by causing the impure acid to percolate through a vessel containing a bed of pebbles through which a stream of sulphuretted hydrogen is made to pass. The sulphuretted hydrogen is decomposed and sulphuret of arsenic (yellow orpiment) is formed, and is separated from the acid by filtration.

[Printed, 1*s*. *Drawings*.]

A.D. 1853, August 18.—N° 1938.

DE BERGEVIN, Auguste Mathieu Maurice.—(*A communication from Guillaume Louis Edouard Buran.*)—" Improvements " in the manufacture of coke, and in the apparatus connected " therewith, and in treating the products obtained therefrom." These are, in reference to this subject, the sulphuric acid used in the purification of gas, being added to the ammoniacal liquors obtained; the solution of the salt so formed may be evaporated in a pan or cistern, the bottom of which is inclined and also corrugated; weak liquors being introduced at the higher end of the cistern, they flow over from one corrugation to the next, and become concentrated; before they arrive at the lower end sulphate of ammonia is formed.

" To obtain muriate of ammonia, the same may be effected by " employing muriatic acid instead of sulphuric acid."

[Printed, 2*s*. 2*d*. Drawings.]

A.D. 1853, August 20.—N° 1949.

CUNNINGHAME, Alexander.—" Improvements in the manu- " facture or production of alkalis and their salts, or alkaline " salts." These are, first, " the employment and use of alum " slate, alum schist, and black stone in the manufacture or pro- " duction of sulphate of soda and sulphate of potash."

Second, " the general arrangement of apparatus or means for " the manufacture or production of sulphate of soda and sulphate " of potash."

The schist or black stone, in preference, is ground to a powder and added in certain proportions to common salt, and " in some " instances," adding " to this mixture a quantity of oxide of iron " or oxide of manganese;" also, preferring " in some instances to " add to the mixture a quantity of ground coke, charcoal, or " coal," but it is stated " none of these matters " are " essential " to the success of the process." The matters are made into a paste with water, moulded into balls or bricks, &c., and " dried, " either wholly or in part," and calcined or roasted at a dull red heat in some kiln " with the free admission of atmospheric air; " also steam." The muriatic acid is condensed in the usual way. " The sulphate of soda is dissolved out of the treated mass with " water, and is crystallized or obtained by evaporation." When sulphate of potash is required, chloride of potassium is substituted for chloride of sodium.

The materials may be heated "either in masses or in a reduced "state in a reverberatory furnace or in a retort," &c.

[Printed, 4*d*. No Drawings.]

A.D. 1853, August 26.—N° 1984.

WATSON, William, junior.—(*Provisional protection only.*)— "Improvements in apparatus for manufacturing prussiate of "potash." These are, "constructing, arranging, and combining "apparatus" for the above purpose, so that the animal matter used in the process may be introduced into the pots or vessels which contain the fused potash "through a tube or passage "descending into and communicating with the lower part of "such pots or vessels," and connecting with these pots or vessels another smaller vessel, "heated by the same fire, for the purpose of "fusing such potash previous to introducing it into such pots or "vessels," and it is so connected that the fused potash "can be "conveniently admitted from the smaller into the larger vessel," connecting a pipe with the pots or vessel to convey the gases evolved during the process "into suitable condensing and other "apparatus by means of exhausting apparatus, with valves" which shut "when such gases cease to be evolved."

[Printed, 4*d*. No Drawings.]

A.D. 1853, August 27.—N° 1993.

TAYLOR, Samuel.—"Improvements in apparatus for generat-"ing and applying carbonic acid gas." These are, "arranging "and combining apparatus" so that "the pressure of the car-"bonic acid gas for the time being in the apparatus regulates the "further evolution of that gas by admitting, retarding, or pre-"venting the combining of the acid with the matters from which "the gas is evolved." "The materials preferred to be used are "marble and dilute muriatic acid." The marble is placed in the bottom compartment of the apparatus, and the dilute acid is put in the upper compartment. The two compartments are divided by a hollow vessel in the upper compartment with a hollow plug at the bottom; in this plug are two apertures to allow the acid to flow in. The cover of the upper compartment presses upon a collar or step on the inner vessel, on which is a washer of vulcanized india-rubber, and secures it in its place. By means of a hollow flexible tube attached to the hollow vessel in the upper chamber the gas generated flows.

[Printed, 6*d*. *Drawing.*]

A.D. 1853, September 9.—N° 2079.

BELL, ISAAC LOWTHIAN.—" Improvements in the manufacture " of sulphuric acid." These are, " the manufacture of sulphuric " acid from factitious pyrites by making the same into a paste," drying " this paste so as to form thin cakes, and afterwards burn- " ing these cakes in suitable kilns," so that it throws off sulphurous acid more readily. The factitious pyrites made by fusing together " tank residuum or soda makers' waste and oxide of iron in a blast furnace," described in N° 772, 1852, is run into water below the boiling point, and forms " a fine mud or slime;" this is spread into thin layers on a drying floor and dried under 212°, as it is highly combustible. In twenty-four hours it is dry and " ready for the kilns in which it is to be placed for the purpose of " burning its sulphur into sulphurous acid." " The kilns may " be of the ordinary construction," but in preference they " are " very similar in form and size to kilns used in the burning of " lime intended to be made into bleaching powder. This kiln is " connected with the oil of vitriol chambers " by flues.

[Printed, 4*d*. No Drawings.]

A.D. 1853, September 10.—N° 2094.

LEYLAND, EDMUND.—" Improvements in apparatus for the " manufacture of sulphuric acid." These are, " the general " system of arrangement and construction of apparatus," and " the application and use of brick chambers for the formation and " condensation of sulphuric acid." The bricks are made of materials " similar to those employed in the manufacture of glazed " stoneware pipes and other articles " capable of resisting acids, highly vitrified. Glass bricks of such a nature are preferred, but any bricks of such a nature are suited and applicable. The joints are made with cements capable of resisting acids. In preference " the chambers are of a conical shape, nearly resembling " the form of circular pottery ovens;" when stays are necessary they are of iron covered with lead. In preference the bottom is of lead, " carrying the lead under the walls, and raising the lead " outside, so that the walls may virtually stand in a large leaden " cup." Outside the chamber is a leaden gutter " to convey the " rain falling upon the building clear away from the leaden cup." " The leaden bottom may be dispensed with if very good bricks " or cement are used."

[Printed, 4d. No Drawings.]

A.D. 1853, September 10.—N° 2096.

JACOB, Charles.—(*Provisional protection only.*)—" Improve-" ments in the manufacture of lime." These are, " employing " oyster shells for such purpose. The oyster shells are burned or " calcined in like manner to that in which limestone has hereto-" fore been burned or calcined."

[Printed, 4*d*. No Drawings.]

A.D. 1853, September 13.—N° 2124.

LAMING, Richard.—" An improved process for purifying gas." This consists in " the purification of gas by saturating its carbonic " acid with ammonia, either alone or combined with hydro-" sulphuric acid, or even combined with carbonic acid in less " quantity than it can absorb, and afterwards removing the re-" sulting carbonate of ammonia, in conjunction with the further " purification of the gas from free hydrosulphuric acid by an effec-" tive oxide of iron." The ammonia or hydrosulphate of ammonia, or ammonia partially saturated with carbonic acid, " may " be introduced in a gaseous state into the unpurified coal gas " itself; or, when scrubbers are used, it may be introduced into " them in solution." " The purification of the gas being thus far " accomplished," the purification is finished in dry lime purifiers by removing hydrosulphuric acid from the gas by means " of any " moist oxide of iron or mixture of oxide of iron, artificial or native, " which is susceptible of becoming changed in the purifiers into " sulphuret of iron, and afterwards of being re-converted by expo-" sure to the air back into an oxide." In N° 11,944 are described " several ways of making oxide of iron suitable for purifying gas, " but it may also be obtained by art in other known ways," as well as natural combined with other matters, such as peat. In preference, interposing " between the washing operation and the " purification by oxide of iron, a second set of scrubbers to remove " any " excess of ammonia. Instead of the above scrubber, mixing with the oxide of iron in preference sulphate or muriate of iron or manganese, in solution or in powder, so as to combine " with both the elements of hydrosulphate of ammonia."

[Printed, 4*d*. No Drawings.]

A.D. 1853, September 28.—N° 2224.

VAN WAESBERGHE, Joseph Fermont.—(Letters Patent *void for want of Final Specification.*——" The improved manu-

"facture of artificial vinegar." This has relation to apparatus. A vessel containing the liquid from which the vinegar is to be produced is placed above another vessel or basin into which the liquid flows, and from which it filters into a double vat beneath, through small holes which are "partially stopped by ears or "spikes of rye or other like grain, or by rolls of suitable "permeable material, for the purpose of preventing the too "rapid passage of the liquid;" four glass tubes pass partly into the double vat, so as to allow air to pass in "to oxidize "or acidify the liquid;" a glass bent tube entering nearly at the bottom of the double vat and extending upwards, indicates the quantity of liquid the vat contains; near the bottom is a wooden tap for drawing off the liquid; there are holes in the double vat in concert with the glass air tubes to produce currents of air. "The evaporative action produced by the glass tubes "serves not only to improve the manufacture of the vinegar, but "also to dissipate or remove the fumes which might prove in"jurious to the health of the workmen attending the apparatus."

[Printed, 6d. Drawing.]

A.D. 1853, October 4.—N° 2269.

GOSSAGE, William.—"Improvements in obtaining certain "saline compounds from solutions containing such compounds." These are, "an arrangement of apparatus for obtaining saline "compounds of soda from solutions produced by the lixiviation "of 'soda ash' or 'black ash,' also sulphate of soda from solu"tions containing such saline compound of soda, which arrange"ment of apparatus provides for evaporation of water, and "consequent separation of saline compounds from such solutions "being caused by streams or bubbles of air drawn through a "column of such solutions elevated in a vessel, by the exhaustive "action of an air pump or of some other apparatus of exhaus"tion." Two pans are described similarly connected together to those described in N° 1455, 1853. Instead of the air vessel by which streams of air are blown through the liquid in the pan, there is "an air vessel connected by means of a pipe" "with an "exhausting air pump, which, by its exhaustive action, occasions "a portion of the solution" to "be drawn up into the vessel, "until certain notches or apertures," "formed in the lower edge "of such vessel, become uncovered with solution, when streams "of air passing through such notches or apertures bubble through

" the solution elevated in the air vessel," and pass through the pipe to the exhausing air pump. The air vessel is enclosed in hot-air chambers. The air vessel above is applied to a series of evaporating vessels, such as the above, all connected together and described in N° 1455, 1853.

[Printed, 8*d*. Drawing.]

A.D. 1853, October 5.—N° 2274.

WILSON, JAMES THOMSON.—" Improvements in the manufacture of alum." These are, " the use of muriate of potash or " muriate of ammonia in connection with ammoniacal liquor " (distilled or otherwise) in the manufacture of alum from shale " by means of sulphuric acid." Instead of adding as much ammoniacal liquor " as is required to convert the whole sulphate " of alumina into alum," as is described in N° 13,389, adding " only about three-fourths of that quantity, and for the remaining " one-fourth of alkali necessary," adding " muriate of potash, or, " if the price admit, muriate of ammonia, either in the solid state " or in solution, as may be convenient."

[Printed, 4*d*. No Drawings.]

A.D. 1853, October 10.—N° 2321.

PATTINSON, HUGH LEE. — (*Provisional protection only.*) — " Improvements in the manufacture of sulphuric acid." These are, " mixing with " " factitious pyrites," described in N° 772, 1852, " a quantity of free sulphur, and burning this mixture in " the common pyrites kilns." It is stated that otherwise this factitious pyrites " does not readily undergo combustion, the heat " produced being scarcely sufficient to drive off and consume the " sulphur it contains chemically combined with iron." The pyrites is reduced to powder mixed with the sulphur, and the whole made into a paste with clay or soda waste, &c. dried in thin cakes, which are broken in pieces and burnt in pyrites kilns.

[Printed, 4*d*. No Drawings.]

A.D. 1853, October 18.—N° 2401.

NOEL, ALPHONSE DOSTE.—(*A communication from Louis Pierre Geslin.*)—" Improvements in the manufacture of zinc white." These are, " an improved construction and combination of furnace " and apparatus for the manufacture of zinc white. For this " *purpose a fire-place is* formed at the lowest part of the building;

" the heat and products pass into a second chamber, and thence " off to the chimney. In each of the chambers are set retorts, and " the ends of the chambers are bricked up, leaving a moveable " brick opposite each retort to admit of the introduction of zinc " through the opening. The retorts, by suitable pipes, com" municate with a compartment which is built at the sides of the " retort stack. The products of such zinc pass into such com" partments, and they meet with sulphurous acid vapours con" ducted by a suitable pipe or pipes from burning sulphur into " the compartment, and thus are the vapours of zinc converted " into zinc superior white, or air may be introduced into the " compartment."

[Printed, 10*d.* Drawings.]

A.D. 1853, October 21.—N° 2435.

CHALLETON, JEAN FRANÇOIS FELIX.—"Certain improve" ments in carbonizing and distilling peat, coal, wood, and other " animal, vegetable, and mineral substances." These are, in the apparatus for distilling such substances in "a progressive and " continuous manner," "so as to extract gases, oils, resinous and " ammoniacal substances, acetic acid, and other matters " from them. The retort is divided into several compartments by sliding doors; "each compartment contains a waggon" "rolling on " wheels made of metal or fire-clay," in which is the material to be carbonized. On one of the external side walls of the furnace are fixed the bearings of several hand or fly wheels; "the shaft of " these wheels pass through the walls, and carry each inside the " furnace a spur wheel gearing into a rack attached to a carriage," " which can thus be moved backwards and forwards inside the " retort." "The sole plate carries a line of rails, which is broken " at each sliding door, and on which rolls the carriage." "One or " more compartments are left outside the furnace for extinguish" ing in them the matter under treatment." "This is effected by " a jet of alcaline vapour." The "waggons are shoved forward " progressively, and as they travel in an opposite direction to that " of the heat, they pass successively from a low temperature to a " higher one, until the carbonization is complete," upon which the waggon is drawn "into the extinguishing chamber." The waggons are assisted in their forward motion by a slight incline given to *the sole of* the furnace.

[Printed, 1s. 2d. Drawings.]

A.D. 1853, November 14.—N° 2635.

CUNINGHAME, Alexander.—(*Letters Patent void for want of Final Specification.*)—"Improvements in the manufacture or "production of sulphuric acid." These are, "by means of "sulphur derived from alum schist, alum slate, gentle slate, and "what is technically known in some parts of Scotland as 'black "'stone,' which is found lying in connection with the alum schist "or gentle slate, as well as from any of those substances contain-"ing sulphur found in the coal measures, and from the sulphates "of barytes and strontian instead of from sulphur or iron and "copper pyrites hitherto employed."

[Printed, 4*d*. No Drawings.]

A.D. 1853, November 15.—N° 2646.

THWAITES, John Hall Brock, and HERAPATH, William Bird.—"Improvements in the manufacture of quinine and other "alkaloids." These are, "the use of fusil oil, camphine, turpen-"tine, or other hydrocarbon insoluble in water" "for separating "alkaloids from the liquid in which they are held in suspension "or solution." The bark powdered is boiled with dilute carbonated alkali, pressed and washed with water and again pressed till dry. "The bark is then digested at a gentle heat, say 160°, "for one hour or more," in dilute hydrochloric acid, and the acid liquor strained off, and the bark treated several times in like manner. "These weaker acid solutions" are "to be used for "exhausting fresh portions of bark." The strong acid solutions are heated with cream of lime in excess, the whole allowed to cool and agitated with fusil oil in preference to turpentine, camphine, &c., when the lighter fluid is drawn off and thoroughly agitated with dilute sulphuric acid yields up the alkaloids to the acid solution, the fluids separate, and the acid one below is drawn off and decolorized by charcoal and by crystallization, &c. The alkaline liquid obtained early in the process is mixed with the liquid containing chloride of calcium from which the alkaloids have been removed by the solvent, chloride of calcium added to precipitate the carbonic acid, as carbonate of lime. The liquid filtered from it and concentrated, and slacked lime or cream of lime added, and agitated with fusil oil, &c., and proceeded with as before.

[Printed, 4d. No Drawings.]

A.D. 1853, November 24.—N° 2736.

RICHARDS, Evan Matthew.—(*Provisional protection only.*) —"Improvements in feed plates to be used for oxidizing lead " and refining silver and lead." These are, instead of employing " a flat iron plate" and allowing "it to be heated," " casting the " plate hollow," and " passing water continuously through it, by " which means the quality of the litharge is improved and a saving " is effected in the wear and tear of the plate."

[Printed, 4*d*. No Drawings.]

A.D. 1853, December 2.—N° 2803.

DEACON, Henry, and LEYLAND, Edmond.—" Improvements in apparatus for the manufacture or production of sulphuric acid." These are, first, "the application and use of " sulphur as an ingredient in the cement of sulphuric acid " chambers or vessels." This cement, it is stated, is well adapted for effecting the junctions of suitable bricks as employed in the construction of sulphuric acid chambers described in N° 2094, 1853. The sulphur of the best quality is ground and mixed with matters also ground and not acted upon by acids, preferring Isle of Wight or other "finely divided silicious sand " free from lime," preferring to use more sand than sulphur. " In " applying the cement" it is preferred " to heat it so far above " the melting point of sulphur that it may begin to thicken." " The application of this cement is necessarily limited by its low " melting point."

Second, " the application and use of natural or artificial stones " or mineral matters" in " the erection and construction of sulphuric acid chambers or vessels, in which the formation and " condensation of the actual manufacture of sulphuric acid is " effected." " Amongst the suitable mineral matters," preferring " to employ the most durable granite," after these " basalts and " other minerals of like character, and finally sandstones." The artificial stones are those such as basalts (slags) or the fusible lavas, conglomerates, "patent impervious siliceous stone," or stone made of "three parts of sand with one part of sulphur."

Third, " the general arrangements and use of materials, apparatus, or means in the construction of apparatus" for the production of sulphuric acid.

[Printed, 4*d*. No Drawings.]

A.D. 1853, December 3.—N° 2817.

GWYNNE, John, and GWYNNE, James Egleson Anderson.—"Improvements in the manufacture of fuel, its preparation "and applications for the reduction of ores, fusing and refining "metals, cementation, or making steel, and treating salts." These are, in reference to this subject, "the use of peat, prepared as "described," for the "treating of salts combined with or without "fluxes or corrective matter." The peat, as it is ordinarily cut from the bog, is "subjected to the action of a series of pressing "rollers." The pieces or slabs are "then passed between "cylinders revolving in opposite directions, or one revolving and "the other stationary, and having at equal distances along their "outer surfaces projections about equal to the thickness of the "slabs of peat," by which the peat is reduced "into pieces of a "convenient form or size for ordinary use or for further pre-"paratory treatment." Such portions of the peat are then dried or "converted into charcoal, and is then ready for use or further "treatment." If used in the treating of salts, &c. it is reduced to powder, and may be mixed with "potash, lime, magnesia, "manganese, soda, phosphoric acid, alkales, fluorine, fluoride of "calcium, silex, or any of the combinations of lime," or such and so much of these substances as is found expedient by practice to use. The peat, &c. is ground up with the substance to be fluxed, pressed in moulds, and calcined in a blast furnace. In this way forming "carbonates or carburets of metals and alkalies."

[Printed, 6*d*. No Drawings.]

A.D. 1853, December 6.—N° 2831.

BELLFORD, Auguste Edouard Loradoux.—(*A communication.*)—"The manufacture of an artificial tartaric acid and the "application of the same to useful purposes." In the Provisional Specification the process for obtaining the "artificial tartaric "acid" is said to be to add acetic acid to oxalic acid in certain proportions, or in preference pass vapours of acetic acid through a solution of oxalic acid, and when the action is complete "to "leave the solution to cool." "Thus is obtained the said arti-"ficial tartaric acid, perfectly crystallized and sufficiently pure "for common purposes." In the Final Specification one process is as *follows*:—"*Sugar*, treacle, molasses, or any other substance

" capable of forming oxalic acid with nitric acid " is treated with nitric acid and " some mother or residue water in which oxalic " acid has been crystallized," more nitric acid " is added, when " reduce this solution until by cooling a crystalline mass is " obtained;" this mass is " next washed for obtaining the tar- " taric acid," sugar added, " dissolved in some of the washing " liquor," the liquid is evaporated, and left to crystallize.

Another process is taking one part weight of sugar, molasses, or treacle, adding acetic acid and nitric acid, heating, crystallizing the oxalic acid, dissolving some sugar and the oxalic acid obtained as above in the washing liquor, and " concentrating at a " low heat." " Crystals of tartaric acid are obtained by crystal- " lizing the mixture at a moderate temperature."

[Printed, 4*d*. No Drawings.]

A.D. 1853, December 9.—N° 2868.

CHISHOLM, JOHN.—" Improvements in the distillation of " organic substances, and in obtaining products therefrom." These are, " animal and vegetable bodies mixed with salt of lime, " potassa, or soda " are distilled in close vessels while air highly heated and deprived of its oxygen is made to pass through the vessel; or " organic bodies mixed with the requisite alkali " " in " a retort has steam passed through it at so high a temperature " that it will decompose and carbonize the organic bodies." The gases escaping are passed into vessels called purifyers containing sulphuric or hydrochloric acid, &c., to arrest the ammonia; " the " gas after being deprived of its ammonia, will possess considerable " heating and illuminating power." The residue in the retorts is dissolved and filtered, the insoluble carbon is collected on a filter, dried, and granulated, &c. The solution " is treated in the usual " way, so as to obtain crystallized ferrocyanide of potassium." The object being to " obtain simultaneously, and by one operation, " compounds of ammonia and cyanogen, or of ammonia only."

[Printed, 4*d*. No Drawings.]

A.D. 1853, December 23.—N° 2982.

GILLOW, JOHN, junior.—(*Provisional protection only.*)—" *Cer- " tain improvements* in the manufacture of salt." These are, " *evaporating the brine* by means of steam generated in a boiler,

" of which the pan containing the brine forms the upper part or " cover, such boiler being fitted with any number of fire-boxes " so placed therein as to be surrounded by water." "The boiler " may be of any convenient form with fire-boxes extending into it " a suitable depth, with a flue or passage between them for the " conveyance of the heat from the fires, and so that it may pass " along underneath the bottom plate of the boiler and heat the " stratum of water contained between such plate and the bottom " plate of the brine pan; the fire boxes being immediately over " them, and the steam from the whole of such water being made " to act upon the bottom plates of the brine pans. Or the boilers " may be constructed with other arrangements of the fire-boxes " and flue or flues."

[Printed, 4*d*. No Drawings.]

A.D. 1853, December 24.—N° 2991.

HARDINGE, HARRIS.—"Manufacturing liquid quartz or silex " to be used in the manufacture of certain compositions for ornamental and useful purposes." These are said to be, first, " the introduction of steam under pressure into the pulverized or " agitated mass," consisting of "finely pulverized quartz saturated with water, and a small quantity of the usual solvents, " as boracic acid, carbonate of soda, and salts and alkalies of a " similar nature," and submit the same to mechanical agitation by the rotation of a hollow spindle and scraper which works inside of the boiler and prevents the mass adhering at any point, " thereby " lessening the quantity of boracic acid or other solvents heretofore used."

Second. "Condensing the steam or vapour produced in the " above process" in a series of reservoirs connected together and " connected with the boiler by means of a pipe. These reservoirs " or condensers are fitted with safety valves. The object is "to " save the particles of liquid quartz that are carried off with the " steam in the form of capsules."

Third. "The introduction of liquid quartz made by the above " process" into various compositions which are specified.

[Printed, 1*s*. Drawings.]

1854.

A.D. 1854, January 3.—Nº 14.

COLLINS, John.—"Improvements in the manufacture of "vinegar." These are as follows:—A vessel is divided into four compartments; in the upper the vinous fermentation is completed, after which it is run into the second chamber packed with chips of hard wood, previously "boiled in water until all impurities are "removed," then dried, charred, and "immersed in highly con-"centrated alcoholic acid," and in which it is converted into vinegar; from this chamber it passes through holes in the bottom into a third chamber packed with sawdust, prepared similarly to the chips in the second chamber, through which it flows into a fourth chamber, transparent, and from thence it "is drawn "off by a glass or other suitable pipe and cock or valve."

[Printed, 6*d*. Drawing.]

A.D. 1854, January 6.—Nº 30.

EDWARDS, Henry Hind.—(*Partly a communication.*)—"Im-"provements in treating peat and vegetable matters for the "purpose of fuel, as well as in the extraction of other useful "products therefrom." These are, first, in "apparatus for the "dessication, moulding, and purification of peat by centrifugal "action."

Second. "The apparatus for the carbonization of vegetable "matters for producing coke or charcoal, &c., without setting "fire thereto, and separating therefrom their constituent parts, "such as pyroligneous acid, acetic acid, tar, paraffine, sulphate of "ammonia, volatile and fixed oils, gaseous or liquid carburet of "hydrogen, &c., &c."

The centrifugal apparatus is vertical or horizontal, and consists of a conical cylinder composed of perforated metallic plates, or of wire gauze strengthened with external rings; within this cylinder is a skeleton framing containing any desired number of compartments or moulds to be filled with the crushed peat. Hot or cold air is admitted by an opening into the upper covering of the internal skeleton framing, which opening also serves for the introduction of the heat. The hot air is supplied by a "flue" or "by "a cylindrical grate dropped into the said opening." An outer casing receives the water and other matters. The volatile matters passing off are condensed in the usual way. When it "is desirable "to act with greater promptitude on large masses," "a cylinder "about 12 feet in diameter, and about 3 feet deep" is used, through the lid of which are pipes from fire-places, and a fan rotating in the interior. The matter to be carbonized is placed on open wirework, and the fan being put in rapid motion draws the air through the fires and pipes, and through the matters aforesaid, and afterwards through openings, "carrying with it all the "vapours that may have been generated during its passage." "The oxygen of the air having been absorbed during its passage "through the fires, the gases may be heated to a very high "temperature without igniting the combustible matter in the "apparatus exposed to their action." For moulded peat, "lignite, "small coal, sawdust, tan, &c.," they may be placed on a revolving endless web, and passed through an apparatus exposed to the action of heated air. "At the end of the apparatus, where the "dried or carbonized matter quits the" apparatus, "is a fan for "drawing in hot air, which after passing through the matter "under operation, escapes through openings into a condenser" "with the volatile products it may carry with it."

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1854, January 6.—Nº 34.

POOLE, Moses.—(*A communication.*)—(*Provisional protection only.*)—"Improvements in the manufacture of dextrine, glocose, "and alcohol, and in employing the products of such manufacture." These are as follows:—"Sawdust, shavings, spent dye "wood, the pulp of beet root," potatoes, &c., in fact substances "composed in great part of cellulose," and "the substance "called dahline" are boiled with "soda, and afterwards with "hydrochloric acid, and hypochlorite of lime to separate the "cellulose from foreign substances. The cellulose thus prepared "is spread out on a stone floor and sprinkled at intervals with "concentrated sulphuric acid. After a time this compound is "mixed with water and boiled, and is then filtered and decolorized "by hypochlorite of lime." Or in place of concentrated sulphuric acid "dilute sulphuric or other acid at a high temperature "is employed." "The liquid obtained in either case" is used to decompose a soap of lime, or it may be used "in the manufacture of tartaric, citric, and other acids."

[Printed, 4*d.* *No Drawings.*]

A.D. 1854, January 10.—Nº 56.

BOWDITCH, William Renwick.—" Improvements in the " purification of gas, and in the application of the materials " employed therein." These are, first, " the purification of coal " and other illuminating gas by the use of clay or aluminous " earth, employed either singly or in combination with lime."

Second. " The employment of the clay or aluminous earth as a " manure or fertilizing agent after the same has been used in the " purification of gas."

The clay, which in preference " is of a red-yellow color," is dried in the open air, or by artificial heat not higher than about 212° F.; it is pulverized by beating or grinding, and moistened with water, and spread out on " trays, riddles, or shelves, in " scrubbing or purifying vessels." The trays of clay are alternated with trays of dry lime, the final purifying layer being clay. In the Final Specification no other use is indicated for the clay or aluminous earth after purifying the gas than as a manure or fertilizing agent, but in the Provisional Specification it states that it may be employed " in the preparation of a solution or any of " the salts of ammonia."

[Printed, 8*d*. Drawing.]

A.D. 1854, January 11.—Nº 69.

LISTER, Ralph.—" Improvements in distilling apparatus." These are, having in " such distilling or operating chambers " a worm or spiral channel worked or formed in the material forming the still sides, so that steam or other artificial heat may be passed through such spiral passage to afford the necessary heating power. These chambers are especially employed, " in the manu- " facture of what is commercially known as bleaching powder."

[Printed, 6*d*. Drawing.]

A.D. 1854, January 13.—Nº 89.

O'MALLEY, Patrick.—" The manufacture of a new drink or " beverage from certain vegetable and other substances, and the " conversion thereof into vinegar." These are, first, common heath or heather, bogbean otherwise buckbean, sage, dandelion, tongue grass, honey, sugar, or other saccharine equivalent, buck*wheat or rivery,* or in lieu thereof, best oats previously roasted, blackberries or other berries possessing like qualities, or instead of such berries, garden apples, or raisins, or preserved grapes, and eggs, prepared by placing them in a vessel, and covered with vinegar, and " buried in the earth for about three days; by this " means the shell of the eggs is very nearly if not wholly dis- " solved; the whole are then beaten up and added to the other " ingredients in the boiler." All these substances in certain proportions may be ground and placed in a boiler with a certain quantity of water, and boiled for about three hours. The whole cooled, and the liquid at 60° F. is fermented for about seventy hours, and racked off, and treated in the same way as in brewing beer.

Second. Converting the above beverage into vinegar by adding to it cold water previously boiled, acetic acid, and refined sugar in certain proportions. These proportions " may be varied accord- " ing to the state of the liquid when intended to be converted " into vinegar." " The required decomposition and conversion " of the ingredients may also be effected by the ordinary process " of fermentation, without the addition of the substances or " articles mentioned above."

[Printed, 4*d*. No Drawings.]

A.D. 1854, January 20.—N° 137.

CONDY, Henry Bollmann.—" Improvements in the manu- " facture of sulphate of soda, sulphate of potash, and other " sulphates, and in the manufacture and employment of muriatic " acid." These are, first, " the products obtained in the manu- " facture of sulphate of soda or potash by the decomposition of " one atom of muriate of soda or potash in the usual way by " one atom of sulphuric acid," consisting " of a mixture of sul- " phate of soda with excess of acid and muriate of soda," is broken into pieces and heated to redness, whilst dry steam enters one end of the vessel and passes out at the other, " by which " means the remainder of the muriatic acid is liberated " and is condensed with the steam; or muriate of potash or of soda is decomposed in leaden or copper stills or vessels with two atoms sulphuric acid, sp. gr. 1390. The bisulphate formed is dissolved in a small quantity of hot water, " and the neutral sulphate of " soda or potash will crystallize out on cooling. The mother " liquor may be used to decompose fresh muriates, or the bisul- " phate may be used to decompose an equivalent of muriate, and

" so form neutral sulphate by the first process. Or a solution of " the bisulphate may be made to act on chalk. Carbonic acid is " evolved, sulphate of soda is in solution, and sulphate of lime " precipitated." Or the bisulphate may be made to act on " copper, zinc, iron, ammonia, or other base," and the salts formed separated " from the sulphates of potash or soda by " crystallization."

Second. Acetate of lime in a chamber is decomposed by passing over it the first portion of the muriatic acid, which distils over free from water, ascertained by holding a piece of glass in the vapour. The acetate is " converted into muriate of lime, and acetic acid " glacial or nearly " so, which is distilled from the muriate, " and rectified in the usual way by distillation."

[Printed, 4*d*. No Drawings.]

A.D. 1854, January 20.—N° 142.

SMITH, Robert Angus, and McDOUGALL, Alexander.—" Improvements in treating, deodorizing, and disinfecting sewage " and other offensive matter, which said improvements are also " applicable to deodorizing and disinfecting in general." These are, acting on matters which create an " offensive or injurious " effluvia " by means of " sulphurous acid either alone or in com- " bination," but preferring " the combination which sulphurous " acid makes with lime and magnesia, or magnesian limestone " acted on by sulphurous acid. Next, carbolic acid, either alone " or in combination." When treating substances containing " phosphoric acid and ammonia, with which the magnesia com- " bines to form the ammonio-phosphate of magnesia," employing " a mixture of sulphite of magnesia and lime, or a mixture of " both and carbolate of magnesia and lime, the latter in very " small proportion, which accomplishes the double purpose of " removing all smell and precipitating in a condition most " suitable for manure the phosphoric acid and ammonia contained " in the substances operated upon," thus forming ammonio-phosphate of magnesia.

[Printed, 4*d*. No Drawings.]

A.D. 1854, January 21.—N° 151.

FALK, Herman Eugene.—" Improvements in preparing or " *manufacturing salt.*" These are, first, " the production of a

" salt of a weight or specific gravity hitherto unobtainable." This, it is said, is effected by mixing together " granulated crys- " tallized salt with patent butter salt." The result produced is a penetration of the small fine patent butter salt in and between the grains and crystals of the other, and a consequent increase of weight to 80 lbs. per bushel and upwards.

Second. " The production of a salt imitating Mediterranean " produce." " Rock salt of so-termed Prussian quality, as it is " raised from the mines in Cheshire, is ground in a mill; the size " of the grain is " regulated by the distance of the crusher from the ends of the trough. The crushed salt is dressed by a series of riddles or screens. " The crushing of rock salt in the mines by " hammers and stampers by manual power, and then either " shipping it in that state, after hand picking the impure parts, " or riddling it by hand in common riddles," is also claimed.

[Printed, 4*d*. No Drawings.]

A.D. 1854, January 21.—Nº 153.

SPENCE, Peter.—" Improvements in manufacturing the prus- " siates of potash and soda." These are, first, " the sole use " of sulphates of potash and of soda in the manufacture of prussiates of potash and of soda in all cases where animal matters are used or calcined along with them.

Second. " The sole use of old and refuse leather for the manu- " facture of prussiates of potash and soda," in " all cases where " such old refuse leather is used or calcined along with sulphates " of potash or soda."

Third. Instead of evaporating the crude mother liquors from which prussiates have been crystallized to dryness, and returning the dry mass " to the calcining pots along with a new quantity of " pearl ash or potash," as is ordinarily done, sulphuric acid is added until effervescence ceases, and a solution of copperas or sulphate of iron is added, as long as there is any precipitate of " Prussian blue," which is collected and washed, and the liquors thus obtained are evaporated to dryness, and the sulphate thus obtained returned to the calcining pots along with new quantities of materials. To the pulp of Prussian blue the next charge of calcined material is added; on adding water, and boiling for at least an hour, the " carbonate of potash and sulphide of potassium " in the materials react upon the Prussian blue, and take from it

" all or nearly all the prussic acid which it contained, and the " liquor being now settled and evaporated," will " yield a much " larger crop of impure prussiate of potash crystals than it would " without the use of the Prussian blue, as now described." The mother liquor is treated as before.

[Printed, 4*d.* No Drawings.]

A.D. 1854, January 23.—N° 172.

BROOMAN, Richard Archibald. — (*A communication.*)— " Improvements in extracting copper from the ore." These are, adding to the ore of copper, ammonia, the quantity of which " varies " with the quality of the ore, but must never exceed twenty-five " per cent. of the quantity of water. The ore and liquid are then " placed in a vessel fitted with an agitator," at the same time introducing a current of air " through a pipe which enters the " vessel. After the agitating and blowing have been acting for " from about six to eight hours, oxide of copper will be held in " the liquid. The liquid must be drawn off and evaporated, " when the pure oxide of copper will remain after the evaporation." " The ammonia may be recovered with little loss by the processes " ordinarily employed for its recovery."

[Printed, 4*d.* No Drawings.]

A.D. 1854, January 24.—N° 176.

MOINIER, Jean Baptiste.—(*Provisional protection only.*)— " A new chemical process for the production of sulphates of " soda, potassa, and alumina, of nitrates of soda and potassa, of " soap, and of hydrochloric, sulphuric, stearic, margaric and " elaidic acids." This consists in causing sulphurous, nitrous, " and hyponitrous vapours " to arrive either together or separately by means of a coil of pipes upon the substance to be " heated," enclosed or liquified in a hermetically sealed vessel " separate from the retort."

[Printed, 4*d.* No Drawings.]

A.D. 1854, January 25.—N° 188.

THORNTHWAITE, William Henry.—(*Provisional protection only.*)—" An improvement in the manufacture of sulphuric acid." This consists in " the use of some catalyzing agent, as platinized " *asbestos or other* platinized substance not liable to change

" from the action of sulphuric acid." " Sulphurous acid, mixed " with the requisite quantity of common air," " is passed over the " catalyzing agent, previously heated;" or " the fumes from a " burning mixture of sulphur and nitrate of potash " are passed " over the heated catalyzing agent, by which a considerable saving " of nitrate of potash is effected."

[Printed, 4*d*. No Drawings.]

A.D. 1854, February 1.—N° 246.

CHENOT, Claude Bernard Adrien.—" Improvements in " accumulating, conducting, and treating gases of combustion, " and also in generating and applying the same to metallurgic " and other purposes." These are, in reference to this subject, obtaining " carbonic acid and nitrogen " " applicable to all manu-" facturing purposes." " Whilst burning any fuel in a furnace " the gases are collected at a very small distance from the burn, " ing point; they will be found to be exclusively composed of car-" bonic acid and nitrogen. If these gases are conducted under a " tall receiver or bell the carbonic acid will soon precipitate, and " the nitrogen occupying the upper portion of the receiver." " The precipitating process may be furthered by three different " means " which are specified. " A receiver, of a given contents, " being filled with carbonic acid got by combustion, and precipita-" tion having taken place, it is easy to ascertain to what height " the pure carbonic acid occupies the receiver; a slide is then " placed in the said receiver so as to isolate the two gases, which " may be drawn off by a pump or any other suitable means." Pure hydrogen may be obtained by causing a jet of steam to take up oxidizable metals in dust or powder and pass through a pipe heated to a high degree of temperature. " The decomposition " will be very rapid, and a powerful current of pure hydrogen " will be thus procured."

[Printed, 1*s*. No Drawings.]

A.D. 1854, February 14.—N° 355.

FAURE, Louis.—" Improvements in the process for manufac-" turing iodine." These are, " the application and mode of ap-" plying sulphurous acid and chlorine to treating the mother " liquors of nitrate of soda for the extraction of iodine there-" from." " When the liquor contains little iodide and much

" iodate," first precipitating " the iodine contained in the iodide " by means of chlorine, and as soon as the reaction is terminated " adding " a sufficient quantity of solution of sulphurous acid for " decomposing the iodates. If the mother liquor contains much " iodide and little iodate," first employing " a solution of sulphurous acid, and afterwards an aqueous solution of previously " tested chlorine."

[Printed, 4*d*. No Drawings.]

A.D. 1854, February 21.—N° 422.

GOSSAGE, William.—" Improvements in the manufacture of " certain alkaline carbonates, and in the useful application of such " carbonates." These are, first, the manufacture of bi-carbonate and sesqui-carbonate of potash and of soda, by exposing a solution of carbonate or sesqui-carbonate of potash or of soda to " carbonic " acid gas (produced by the combustion of carbon) " while passing through an absorbing tower;" or by exposing these salts moistened on trays to the same gas.

Second. " The manufacture of bi-carbonate and sesqui-carbonate of ammonia in aqueous solution by introducing ammoniacal " gas and carbonic acid," produced as above, or produced from heating the bi-carbonate or sesqui-carbonate of potash or soda in an " absorbing tower," water being introduced at the same time. Also these salts of ammonia in the " solid state by the combination of carbonic acid similarly obtained, with ammoniacal gas " obtained by the decomposition of sal-ammoniac, produced by " the decomposition of common salt with carbonate of ammonia."

Third. Manufacturing bi-carbonate or sesqui-carbonate of ammonia by introducing ammoniacal gas and pure carbonic acid gas, obtained by heating the corresponding salts of potash or soda, into a mixing vessel divided into compartments and revolving on its axis, " together with a sufficient quantity of water to dissolve " the whole or part of the ammoniacal salt so produced."

[Printed, 1*s*. Drawing.]

A.D. 1854, February 23.—N° 438.

HUNT, William.—" Improvements applicable to the utilizing " of ammonia given off in certain manufacturing processes." *The Final Specification* " relates only to the recovering of ammonia" *and muriate of ammonia*, which is volatilized, " from the dripping

" trough during the process of coating or galvanizing iron;" and this is to be effected by placing " a hood or inverted funnel " over the dripping trough, and causing the vapours to pass along a flue into a condenser filled with coke, kept moist with dilute muriatic acid. Instead of the coke, the vapours " may be made to pass " through a mass of brushwood or gorse, which may be used " without liquid." The muriate of ammonia will be deposited on the brushwood or gorse, and may be shaken off from time to time." The caustic ammonia may be drawn forward into a coke condenser (by means of a chimney draft), the coke moistened as before. In recovering these vapours, to obtain a substance suitable for manures, sulphuric is substituted for muriatic acid. The solutions are evaporated to obtain crystals of the salts. In the Provisional Specification it is proposed to " add salt or brine with " the coal used in retorts or coal ovens." " As the coal becomes " heated the salt is decomposed and muriatic acid goes off, which " combines readily with the ammonia, and condenses readily in " the hydraulic main " as " muriate of ammonia."

[Printed, 10*d*. Drawing.]

A.D. 1854, February 24.—N° 447.

COWPER, CHARLES. — (*A communication from Léonard Laureau.*)—" Improvements in the manufacture of potash and " soda." These are, making these substances " from natural or " artificial silicates containing those alkalies," by reducing them to powder, in some cases heating and throwing into water; by making them into beds with straw or sawdust, alternate layers of each; watering the beds " with a solution containing a small " quantity of urine, or other animal matter, so as to produce fer- " mentation." In six months the whole is drenched with a thick cream of lime, and left for a week; is calcined, avoiding a temperature which would vitrify the materials. " The calcined sub- " stance may be quenched in water, and is then ground " and lixiviated, and the " solution is filtered through quicklime and " afterwards through linen, and is a solution of the alkali in a " caustic state and of remarkable purity." The insoluble residue after lixiviation " may be used for making mortar, and forms an " excellent puzzolana."

[Printed, 4d. No Drawings.]

A.D. 1854, February 28.—N° 483.

SIMPSON, William.—" An improvement in employing (in the " manufacture of soap) a product obtained when manufacturing " pulp from straw." This consists in mixing " all the solutions " of alkali drawn off, and also obtained by washing the straw," and employing them in the manufacture of soap, first separating " the rougher impurities by filtering the solution through a filter " bed, composed of a layer of unslacked lime and a layer of " carbonate of soda, which process of filtering, in addition to " separating the coarser matters, has also the advantage of rendering the solution more caustic."

[Printed, 4*d.* No Drawings.]

A.D. 1854, March 8.—N° 553.

COOKSON, William Isaac. — " An improvement in the " reduction of lead ores." This consists " in the use and application of metallic iron, or oxide of iron, or calcined iron " pyrites, in the process of smelting or reducing lead ore, whereby " the sulphur contained in the ore, by being caused to combine " with the iron will be saved, so that it may be used in the arts. " The iron or oxide of iron being by the subsequent separation " of the sulphur therefrom, reduced to a state to be again employed in reducing fresh lead ore." Lead ore and metallic iron or the above oxide are " mixed together, and a small quantity of " alkali or neutral salt and carbonaceous matter is added thereto; " the mixture is then subjected to heat in a furnace or crucible, " &c. By this means the lead ore will be reduced to the metallic " state," and the iron or oxide is converted into sulphuret, which " exposed to a damp atmosphere will fall into powder." This is made into a paste with water and moulded into pieces, which are dried and calcined " as pyrites in an ordinary kiln used for the " manufacture of sulphuric acid," or " the sulphuret of iron in " a powdered state may be burnt or roasted in a suitable furnace " for a similar purpose." The oxide resulting is " to be crushed " and mixed with carbonaceous matter, after which it may be " again used."

[Printed, 4*d.* No Drawings.]

A.D. 1854, March 10.—N° 582.

NEWTON, **Alfred Vincent.**—(*A communication.*) — " Im" *provements in the* mode of purifying coal gas, and of obtaining

" during the manufacture of the gas a certain purifying material, " and in apparatus to be used in purifying gas." These are, first, in purifying coal gas generally, by introducing into it caustic ammonia, in sufficient quantity to saturate its free sulphuretted hydrogen as well as its free carbonic acid, and then removing from it all the ammoniacal compounds by washing with water.

Second, "in purifying coal gas by introducing into it caustic " ammonia, in sufficient quantity to convert its free carbonic " acid into a salt of ammonia, washing out the ammoniacal salts " in conjunction with the removal of its free or combined sul- " phuretted hydrogen, by means of sulphurous acid, and finally " washing the gas again with water."

Third, "in the mode of introducing caustic ammonia into " impure gas for its purification, by eliminating it from any " mixture containing sulphate or muriate of ammonia in retorts " connected with the hydraulic main or other passage for the " gas."

Fourth, "in the use of a purifying vessel for purifying coal gas, " either wholly or in part." The purifying vessel referred to may consist of a vessel divided horizontally by as many divisions or shelves as may be required. These shelves are pierced with holes so small that the ascending gas prevents the liquor on the shelves descending thereby.

[Printed, 4*d*. No Drawings.]

A.D. 1854, March 13.—N° 603.

HAEFFELY, EDWARD.—" Improvements in the manufacture of " stannates of soda, potash, and ammonia." These are, the production of stannates of soda, potash and ammonia, by forming stannic acid by the oxydation of metallic tin in an alkaline solution by the agency of an oxide of lead, or any other oxide having a less affinity for oxygen than tin. " The stannate " of soda" may be prepared " by introducing into a metal pan " litharge or red lead, (or hydrate of peroxide of iron, hydrate of " peroxide of manganese, manganate of soda, indigo, and others,)" " and a solution of caustic soda of commerce containing about " twenty-two per cent. of alkali, and reduced by the addition of " water or the washings hereafter named, if required;" a plombate *or plombite of the* alkali is thus formed, heat being applied for the purpose of hastening the operation. Feathered metallic tin is then suspended in a bag or thrown into the mixture, when, immediately the oxygen from the alkaline solution of the oxyde of lead passes to the metallic tin, forming stannic acid, which unites with the alkali, whilst metallic lead in a spongy state is precipitated. "The proportions I use are sixteen pounds of tin, "forty-five pounds caustic soda at 70° Twaddle, from 70 to 80 "of litharge (or 54 red lead). When the tin has entirely disappeared, which will be after several hours boiling, say, four or "five, depending, however, upon the granulated state of the tin, "the fire is withdrawn, and the precipitate allowed to settle. The "clear solution of stannate of soda is then decanted," and is now ready for use. The precipitated lead (or other metal) may be speedily reoxidized by a heat approaching to redness, with exposure to the air, and be used again for another operation.

[Printed, 4*d*. No Drawings.]

A.D. 1845, March 15.—N° 622.

TRUEMAN, ALFRED.—"An improved furnace for the calcination of copper ores and other mineral substances." This consists of a "furnace in which are arranged several retorts or tubes, "preferably side by side and on the same level." They "may be "placed on an incline or one above the other." They "are "heated by a fire at one end of the series, the flame from which "passes under and over each retort;" by this means "the retort "nearest the fire is heated most." The ore or mineral is "introduced at or near one end of the retort farthest from the fire, "suitable apparatus being provided to admit the requisite "quantity from a hopper placed above." "A worm or screw is "caused to revolve by suitable motive power through the whole "length of the retort, in such manner that the ore or other "mineral substance introduced at or near one end of the first "retort may be moved through to the other end or near to the "end, whence it passes to the second retort, and by the action of "a screw is moved through it to the opposite end and thence to "the third retort, and so on." The ore is finally pushed out of the last retort "by the action of the screw, and falls into a "receptacle provided for that purpose." "During the passage "of the ore through the retorts or tubes a sufficient quantity of "air to convert the sulphur evolved into sulphurous acid" may be forced or drawn in at various places, and the sulphurous acid passed into a "chamber or other apparatus to convert it into sul-" phuric acid." If sulphur is required, only sufficient air is admitted "to oxidize the metals from which the sulphur is " liberated."

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1854, March 28.—N° 717.

HÄHNER, William.—(*A communication.*)—"Improvements in " the manufacture of muriatic and sulphuric acids." These are, the manufacture of sulphuric and muriatic acids by the action of chlorine (obtained when manufacturing sulphate of soda or otherwise) on sulphurous acid in suitable chambers, whether such sulphurous acid be obtained by the combustion of sulphur or by the roasting of ores. "In the passage from a soda furnace is a steam " jet; in this chamber is a series of screens which cause the hydro-" chloric acid to take a circuitous course; peroxide of manganese " is introduced by passages and spread between the screens." The vapours, "after passing over the peroxide of manganese, by which " they are wholly or in part converted into chlorine," enter a chamber, into which are also introduced by a pipe, "fumes from " burning sulphur" or from burning ores. These gases act on each other, forming "sulphuric and muriatic acids," some condensed in this chamber and in another, and the gases finally pass through a chamber containing moistened pieces of coke.

[Printed, 8*d.* Drawing.]

A.D. 1854, March 28.—N° 719.

HÄHNER, William.—(*A communication.*)—"Improvements " in the manufacture of alkaline sulphites, and in purifying and " treating gases." These are, the use of a beater or instrument in combination with a vessel, whereby liquids are raised into spray for the purpose of acting on gases brought in contact with such spray. For this purpose a vessel may be formed very similar to that used in constructing a paper engine. This vessel is partly divided longitudinally, leaving an opening at each end of the partition, by which a continuous channel is formed for the fluid. On one side of the partition, and across this channel, there is a cylinder or wheel with numerous radial spokes or arms. The wheel or cylinder by its rotation gives motion to the fluid, and causes it to circulate in the channel. The bottom of the channel near the wheel is formed with two inclines, having between them a concavity in which the wheel partly revolves. The vessel is covered all over, and above the wheel there is an enlargement forming a closed chamber, into which the wheel throws the fluid. There is an induction pipe and an eduction pipe for the gases. When producing a sulphite of an alkali, a solution of the carbonate of the alkali is placed in the vessel, and sulphurous acid gas is conducted into the compartment above the wheel, and such gas will be brought in contact with the solution under the most favourable circumstances. In purifying or acting chemically on gases the purifying or chemical liquid is placed in the vessel, and the gas introduced and subjected to the action of the liquid contained "in the vessel," as before explained. The machine may also be advantageously used in bleaching.

[Printed 6*d*. Drawing.]

A.D. 1854, March 31.—N° 738.

COSTE, Jean Marc Gustave.—(*Provisional protection only.*)—"Revivifying animal charcoal that has already been used, and "obtaining by a peculiar process prussiate of potasse or soda from it." This consists as follows:—Potash or soda, sulphate of iron, and spent animal charcoal, all in certain proportions, are pulverized, and calcined, and boiled with a certain amount of water, "and then carefully filtered and washed; this is twice "repeated. After the last filtration the animal charcoal is to be "dried in a proper stove, and the liquid is to be evaporated so as "to produce the prussiates in the crystallized form."

[Printed, 4*d*. No Drawing.]

A.D. 1854, April 3.—N° 762.

GOSSAGE, William.—"Improvements in the manufacture of "certain kinds of soap." These are, introducing into soap "soluble glass," prepared by mixing "about nine parts of soda "ash, containing fifty per cent. of real soda, with eleven parts of "clean sand," and melting the mixture in a reverberatory furnace, with stirring to obtain a perfect combination of the sand and soda, when it is run into "metallic moulds or in moulds "*formed of damp* sand." When potash is used in place of soda "*for the production* of soluble glass," mixing "about equal

" weights of dry carbonate of potash and clean sand," and melting the mixture with stirring in a reverberatory furnace, as before. In preference using " such proportions of silica and alkali for the " production of 'soluble glass' that the glass so produced may " be nearly all soluble in water alone," but sometimes it may be found " desirable to increase the solvent power of the water " employed by adding thereto a solution of caustic soda or caustic " potash." "The solution of the soluble glass" is effected " by " grinding this to powder and agitating such powder in a pan " containing boiling water;" or in preference, it is placed, in pieces about the size of a man's fist, in a vessel with a perforated diaphragm, and hot water is introduced into it together with steam. The water dissolves the silicate, and becoming heavier descends, " whilst the lighter fluid becomes elevated into contact " with the pieces of glass." The solution is concentrated for use.

[Printed, 4*d*. No Drawings.]

A.D. 1854, April 4.—N° 766.

HIGGIN, James.—" Improvements in the mode or method of " separating metals from each other when in conjunction, and in " obtaining useful products therefrom." These are, first, " the " use of acids, either alone or mixed with an oxidizing substance, " for the separation of metallic tin, or preparations of it from " scrap tin plate." The acid preferred is muriatic acid diluted with two parts of water; the oxidizing substances are " nitrate of " soda, bichromate of potash, peroxide of manganese, and per- " salts of iron," preferring nitrate of soda and muriatic acid, " because the chlorine is only liberated as wanted." The solution of metals containing tin and iron is neutralized by powdered chalk and the precipitate washed. The oxide of tin may be reduced, or boiled with caustic soda to make stannate of soda, or dissolved in muriatic acid and crystallized, or zinc is added to the solution from the scrap and the tin is precipitated.

Second. " The use of chlorine gas or a liquid containing chlorine " for the same purpose." The above mixture of muriatic acid and nitrate of soda yields chlorine in solution. When chlorine gas previously dried is passed over vessels filled with scrap tin the tin is rapidly removed as bichloride, which is condensed in water at the other end of the vessel.

Third. Obtaining *ammonia* or the salts of ammonia from the solution of muriatic acid and nitrate of soda, after treament of scrap tin, by distilling it with hydrate of lime.

[Printed, 4*d*. No Drawings.]

A.D. 1854, April 7.—N° 815.

CONDY, **Henry Bollmann.**—" Improvements in concentrat- " ing beer, ale, cider, wine, and vinegar." These are said to be concentrating these substances by freezing, distilling, or crystallizing matters therein, as follows:—First, the liquid to be acted upon is placed " in a vessel so fixed that artificial or natural cold " may be applied to it." " The liquid is gradually cooled down " until it is about half congealed." " The liquid portion will be " found to contain the greater part of the acetous or spirituous " strength;" this liquor is separated and called first liquor. The first liquor is then replaced in the refrigerating vessel, and subjected " again to cold until again about half of the liquid is congealed;" afterwards the liquor is again drained off from the crystalline mass of ice, and the liquor called " second liquor is either considered as " sufficiently concentrated or may undergo a still further degree " of concentration," as before. The congealed portions may be thawed, and " may be employed for mixing with fresh wash in the " case of brewing beer or vinegar, or they may be treated again " with cold." " The liquors resulting from thawing the ice, when " mixed together," are named third liquor, and may be subjected as before to cold and partly congealed, and the liquor added to the original liquor " to be converted into first liquor by freezing " out its water, as before described." By this process all of the above-named substances may be concentrated, and " will be " capable of being reduced to the same strength by the simple " addition of water." The method of obtaining the cold is as follows:—Sulphurous acid is collected in a copper gasometer; a force pump worked by an engine " draws the gas from the gaso- " meter and forces it into a receiver of copper at such a pressure " that the gas becomes liquified;" to this receiver is attached a safety valve. " From this receiver the liquid sulphurous acid is, " by means of a tap, allowed gradually to escape into a long coil " of copper pipe immersed in the vessel in which the liquid to be " cooled is placed." After circulating in this coil of pipe the gas is conducted back to the gasometer from which it first started."

Second. Dissolving in either of the above liquids to be concentrated for every ten parts of the liquid, at its boiling temperature, "eight and a half parts of dry or anhydrous sulphite of soda, " or seven and a half parts of dry sulphate of soda, or twelve and " three-quarter parts of dry acetate of soda (by preference the " latter), or other dry salt of a suitable nature," and these cooled the crystallized salt is set " aside to drain, when the liquor will " contain all or nearly all the strength."

Third. Concentrating any of the above liquids by distilling gradually in the ordinary manner one-sixth part, which is put aside and the next two-thirds. " In the case of vinegar, the first " portion will contain the flavour, the next two-thirds only very " weak vinegar, and that left in the still will be stronger vinegar; " the last is to be mixed with the first portion containing the " flavour, and will then be concentrated vinegar, requiring only " the addition of a quantity of water equal to that separated to " again become ordinary vinegar."

[Printed, 4*d*. No Drawings.]

A.D. 1854, April 13.—N° 865.

ELLIOT, George.—(*Provisional protection only.*)—" Improve" ments in the manufacture of carbonate of soda." These are, exposing " chloride of sodium, mixed with about its equivalent " of the carbonate of one of the alkaline earths and water, to the " action of carbonic acid under pressure," " producing a sparingly " soluble bicarbonate of soda, and a highly soluble chloride of the " metallic base of the alkaline earth employed, and they are " separated when still under pressure."

[Printed, 4*d*. No Drawings.]

A.D. 1854, April 18.—N° 894.

GIBBS, Henry Hucks. — (*A communication from Pedro Gamboni.*)—" Improvements in the manufacture of nitrate of " soda." These are, " dissolving out the nitrate of soda from " the crude materials by steam;" " the stone or earth is placed " in a vessel having a perforated bottom, below which the steam " is admitted," the steam is " low-pressure steam." " The " matters under process are kept cooled by means of an external " jacket to the vessel, in which jacket cold water is applied." The " dissolved nitrate descends through the perforated bottom of the " vessel," and is conducted by a pipe into receivers.

[Printed, 4*d*. *No Drawings.*]

A.D. 1854, April 25.—N° 946.

COLLIER, William.—" Improvements in evaporating pans " for concentrating solutions of certain acids, alkalies, and salts." These are, making such vessels with a jacket, " with a pipe at one " side through which to admit steam," and a pipe to carry off condensed water; or " the heating process may also, if desired, " be kept up by circulating hot water instead of using steam, by " arrangements well known in the employment of hot water and " of steam for general heating purposes."

[Printed 4*d*. No Drawings.]

A.D. 1854, May 2.—N° 982.

TRUEMAN, Alfred.—" Improvements in the manufacture of " sulphuric acid when roasting copper ores, and also when burn" ing sulphur or iron pyrites." These are, first, " the application " in suitable apparatus of platinum or oxides, in combination " with ovens or furnaces wherein copper ores are roasted, in order " to convert the sulphurous acid gas derived from such process of " roasting copper ores into sulphuric acid. If platinum be used, " it may be employed in any suitable form," but preferring platinum wire rolled " loosely into balls, and placing them in earthen" ware tubes or passages " kept " at a red heat;" and when oxides of iron, copper, chromium, and manganese are used, " they are broken into small lumps and similarly used." Through these tubes the sulphurous acid, " together with oxygen from " atmospheric air or otherwise," is passed, " whereby sulphuric " acid will be formed," and passes off through " numerous small " pipes in connection with the heated tubes," which descend a short distance under water in a vessel connected with an exhauster; or a fan or otherwise may be employed to drive the gases through the heated tubes.

Second. " The application of platinum, and also of oxides, " combined with pumice stone or porous matters, in the manufac" ture of sulphuric acid." Pieces of pumice stone, burned clay, or the like, are steeped in a solution of chloride of platinum, and subjected to a high heat to drive off the chlorine, or in a solution of a salt of any of the above oxides, " the sulphate is as con" venient as any," and similarly heated. These are introduced into tubes and heated as above, and the " sulphurous acid gas, " whether obtained from roasting copper or other ores, or by

" burning sulphur or pyrites," is passed through the same with oxygen, and the product condensed in water.

[Printed, 4*d*. No Drawings.]

A.D. 1854, May 2.—N° 988.

PLISSON, Désiré.—" Certain improvements in chemical con-" densing apparatus." These are, first, in bottles used for condensing, as in " the manufacture of nitric, muriatic, sulphuric, " acetic acids," &c., having " a small tube of ceramic material " fixed to the bottom of the bottle," communicating " with the " contents of the bottle by means of a little opening near the " bottom, and rising a little above the bottom it emerges through " the side," and terminates above the level of the opening, near the bottom.

Second. " In superposing and connecting or so arranging the " bottles used " for the above purpose, so " as to form a con-" densing circuit in a small space." The vapours pass off into a series of bottles connected together by means of tubes, some placed one above the other.

Third. A bottle with three necks; the middle neck is that into which the tubular end of the upper bottle fits, and " the outer " ones are for connecting each bottle to the next by means of a " communication pipe."

Fourth. A syphon funnel for introducing water into the bottles, being a bent tube, the short limb of which opens inside the bottle, the long limb outside.

Fifth. A vessel " which by means of a small discharge cock, " allows the escape of a continuous streamlet of water " into the above syphon funnel.

Sixth. " Taking the gas off at the top of the boiler, by means " of one or more parting tubes " of " glass or any other suitable " material."

[Printed, 10*d*. Drawings.]

A.D. 1854, May 9.—N° 1038.

HORSFORD, Eben Norton.—" The removal of chlorine from " substances and fabrics." This consists in preparing a substance which the patentee names " antichloride of lime " as follows :— " A horizontal wooden trunk of one and a half feet square area " and sixteen *feet long is* divided through the lower half into

" equal spaces of ten inches in length, by partitions rising from " the bottom to a height of eight inches. Loosely fitting into " these spaces will be paddles, connected by arms to a shaft " extending from end to end of the trunk. This shaft will be " revolved by power applied at either extremity." Milk of lime enters the trunk at one end through an aperture; sulphurous acid from burning sulphur is drawn into it, and the lime saturated with sulphurous acid passes out at the other end, and is "received " on cloth filters, or in baskets with cloth lining, which will permit the water to drain readily;" after which it is dried, and may be packed, and is ready for use, &c.

[Printed, 4*d*. No Drawings.]

A.D. 1854, May 10.—N° 1042.

REECE, Rees.—" The smelting of iron by means of turf or peat, " simultaneously with the combustion of the peat and collection " of the products therefrom." This is said to consist in the adaptation and application of a blast furnace combined with a condenser and scrubbers. "The furnaces are filled with peat or " turf as dry as it can be procured, this is set on fire, a gentle " blast is put on, the hoppers are closed, and the products of combustion sent from the furnaces through the pipes into the hydraulic main and thence through the condenser." The blast is then gradually increased to its full extent; "the furnaces are " constantly kept full with peat." When the furnaces have been in blast for some days, " the blast is heated from 300° to 700° F., " iron ore and the usual flux are mixed with the turf in the furnaces, the quantity of ore and flux being small at first and " gradually increased until the furnaces are fully loaded. The " iron is removed from the furnace in the usual way. The products of combustion, consisting of tar water and inflammable " gases, are collected;" the gases are conveyed and burned in the fires, the water is manipulated for "acetate and carbonate of ammonia," and " methylic, alcohol, or wood spirits;" " and the tar, " consisting of paraffine and paraffine oil, is converted into these " bodies."

[Printed, 1*s*. Drawings.]

A.D. 1854, May 23.—N° 1149.

KUCZYNSKI, Joseph.—" Improvements in preparing baryta *" and its salts."* These are, mixing the sulphate of baryta and charcoal with chloride of sodium or other suitable salt, and this mixture when heated becomes fused, and thus a much more perfect reaction is obtained; and in place of being compelled to allow the materials to cool in the furnace, running the compound from the furnace, and thus a saving both of time and fuel is effected. "The sulphite of barium thus obtained is dissolved in "water, and may be reduced to the caustic state by boiling with "oxide of zinc or other metallic oxide." The hydrate of baryta may be converted into carbonate by the action of carbonic acid gas. The acetate of baryta may be employed in dyeing and printing as a substitute for acetate of lead. The borate and other salts of baryta may be used in the manufacture of glass in place of similar salts of lead.

"By roasting, the sulphuret of zinc or copper, formed in the "process as above mentioned, may again be reduced to the state "of oxide."

[Printed, 4*d*. No Drawings.]

A.D. 1854, May 25.—N° 1166.

MANTRAND, Edouard Carl.—"Improvements in the manu- "facture of phosphorus." These are, "obtaining phosphorous "by decomposing matters containing phosphates, and more "particularly phosphates of lime, by thoroughly mixing with "them a suitable quantity of carbonaceous matters alone or mixed "with a suitable quantity of silicious matters, and afterwards "passing in suitable apparatuses hydrochloric acid gas or chlorine "through these mixtures when the same are brought to a bright "red or white heat." In preference, hydrochloric acid gas is used rather than chlorine. "The phosphorus, along with some phos- "phuretted hydrogen and oxide of carbon, will distil over. The "phosphorus will condense in the tank or condenser, and is "gathered and afterwards purified in the ordinary manner." The phosphuretted hydrogen escaping by a jet is burned under a bell and converted into phosphoric acid; is dissolved in water, and the oxide of carbon escapes by a pipe. Any phosporic acid is obtained by evaporating the water, "and transformed into phos- "phorus by deoxidizing with charcoal in retorts at a proper "degree of heat."

[Printed, 8d. Drawing.]

A.D. 1854, May 31.—N° 1211.

NEWTON, Alfred Vincent.—(*A communication.*)—(*Provisional protection only.*)—" An improved mode of manufacturing " soluble silicates." This consists as follows :—" Feldspar, or the " slag of furnaces, particularly of iron furnaces, is employed ; the " feldspar or the slag (which is mostly composed of a double silicate of lime and alumina with excess of base) is first ground in " any desired quantity and then mixed with caustic lime and " soda ash upon a hard floor or pavement. The compound is now " made up into a sharp heap, and kept wet by daily applications " of a shower of water for a month, more or less, when the silicate will be fully formed." These silicates are " to be used as a " manure, either alone or in combination with guano, phosphorite, " or other manures in common use ; or in the formation of artificial nitre beds, or for any other purpose to which these silicates " may be found applicable."

[Printed, 4*d*. No Drawings.]

A.D. 1854, June 1.—N° 1218.

SCHWABE, Stephan.—(*A communication.*)—(*Provisional protection only.*)—" Making sulphate of soda or Glauber's salts." This consists in mixing " the refuse produced in the ordinary " manufacture of the carbonate of soda or soda ash," with " muriate of soda or common salt," and heating the mixture in a reverberatory furnace for some time, lixiviating the residue ; the solution is evaporated, " and the sulphate of soda or Glauber's " salts remains in a solid state."

[Printed, 4*d*. No Drawings.]

A.D. 1854, June 8.—N° 1270.

RICHARDSON, Thomas.—" Improvements in the manufacture " of alum." These are, " in manufacturing sulphate of alumina " by heating together (in contact with air) alum shale or other " aluminous mineral, and either artificial or natural pyrites ; also in " treating roasted alum shale with sulphuric acid to obtain sulphate of alumina. In both cases the sulphate of alumina is " converted into alum in the ordinary manner." Artificial or natural sulphuret of iron, about ten per cent., previously ground, is scattered over the shale and the mixed materials submitted to slow combustion. The refuse after lixiviating the calcined material is now thrown away as useless, but the patentee has "found that it contains a large per-centage of alumina in a con- "dition peculiarly adapted for solution in acid," and therefore the exhausted alum shale is mixed with "about 50 per cent. of sul- "phuric acid of 1·600 specific gravity, in shallow leaden pans, "either cold or assisted by heat in a manner similar to that now "practised when pool or other clays are employed." "The sub- "sequent evaporation and treatment is conducted precisely as at "present, either for the manufacture of alum or common sulphate "of alumina."

[Printed, 4*d*. No Drawings.]

A.D. 1854, June 9.—N° 1274.

BRAMWELL, Thomas.—"Improvements in the manufacture "of the carbonates and prussiates of potash and soda." These are, first, in the manufacture of prussiates of potash and soda, using the sulphates or sulphides of these bases instead of pot or pearl ash, or soda or carbonate of soda. When the sulphates or sulphides are used, "metallic iron, as borings, turnings, or clip- "pings, or an oxide or ground iron ore," is added so as to take up "the sulphur in the said alkaline salts" during the heating, "which remains in the black residuum on lixiviation of the mass "in water, leaving in solution the prussiate of potash or soda to "be crystallized out in the ordinary way."

Second. "The separation of carbonate of soda from a mixed "solution of carbonate of potash and soda, by means of salting "out the carbonate of soda by boiling." When "prussiate of "potash is made from sulphate of potash salts from kelp, which "always contain a portion of soda salts," it is "necessary from "time to time to separate the soda salts from the potash solu- "tion," this is done by boiling "the return potash solution "after the prussiate of potash is crystallized out, until the car- "bonate of soda begins to fall or salt down as it is termed." This is removed as it falls; when the gravity of the liquid is observed to increase, "the carbonate of soda is all salted out."

Third. "The separation of sulphur from solutions of potash or "soda salts containing sulphides by means of black oxide or of "finely divided iron, as described, whether the said potash or soda

A.D. 1854, May 31.—N° 1211.

NEWTON, Alfred Vincent.—(*A communication.*)—(*Provisional protection only.*)—" An improved mode of manufacturing " soluble silicates." This consists as follows :—" Feldspar, or the " slag of furnaces, particularly of iron furnaces, is employed ; the " feldspar or the slag (which is mostly composed of a double silicate of lime and alumina with excess of base) is first ground in " any desired quantity and then mixed with caustic lime and " soda ash upon a hard floor or pavement. The compound is now " made up into a sharp heap, and kept wet by daily applications " of a shower of water for a month, more or less, when the silicate will be fully formed." These silicates are " to be used as a " manure, either alone or in combination with guano, phosphorite, " or other manures in common use ; or in the formation of artificial nitre beds, or for any other purpose to which these silicates " may be found applicable."

[Printed, 4*d*. No Drawings.]

A.D. 1854, June 1.—N° 1218.

SCHWABE, Stephan.—(*A communication.*)—(*Provisional protection only.*)—" Making sulphate of soda or Glauber's salts." This consists in mixing " the refuse produced in the ordinary " manufacture of the carbonate of soda or soda ash," with " muriate of soda or common salt," and heating the mixture in a reverberatory furnace for some time, lixiviating the residue ; the solution is evaporated, " and the sulphate of soda or Glauber's " salts remains in a solid state."

[Printed, 4*d*. No Drawings.]

A.D. 1854, June 8.—N° 1270.

RICHARDSON, Thomas.—" Improvements in the manufacture " of alum." These are, " in manufacturing sulphate of alumina " by heating together (in contact with air) alum shale or other " alumina mineral, and either artificial or natural pyrites ; also in " treating roasted alum shale with sulphuric acid to obtain sulphate of alumina. In both cases the sulphate of alumina is " converted into alum in the ordinary manner." Artificial or *natural sulphuret of iron*, about ten per cent., previously ground, is scattered over the shale and the mixed materials submitted to slow combustion. The refuse after lixiviating the calcined material is now thrown away as useless, but the patentee has "found that it contains a large per-centage of alumina in a con-"dition peculiarly adapted for solution in acid," and therefore the exhausted alum shale is mixed with "about 50 per cent. of sul-"phuric acid of 1·600 specific gravity, in shallow leaden pans, "either cold or assisted by heat in a manner similar to that now "practised when pool or other clays are employed." "The sub-"sequent evaporation and treatment is conducted precisely as at "present, either for the manufacture of alum or common sulphate "of alumina."

[Printed, 4*d*. No Drawings.]

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BRAMWELL, Thomas.—"Improvements in the manufacture "of the carbonates and prussiates of potash and soda." These are, first, in the manufacture of prussiates of potash and soda, using the sulphates or sulphides of these bases instead of pot or pearl ash, or soda or carbonate of soda. When the sulphates or sulphides are used, "metallic iron, as borings, turnings, or clip-"pings, or an oxide or ground iron ore," is added so as to take up "the sulphur in the said alkaline salts" during the heating, "which remains in the black residuum on lixiviation of the mass "in water, leaving in solution the prussiate of potash or soda to "be crystallized out in the ordinary way."

Second. "The separation of carbonate of soda from a mixed "solution of carbonate of potash and soda, by means of salting "out the carbonate of soda by boiling." When "prussiate of "potash is made from sulphate of potash salts from kelp, which "always contain a portion of soda salts," it is "necessary from "time to time to separate the soda salts from the potash solu-"tion," this is done by boiling "the return potash solution "after the prussiate of potash is crystallized out, until the car-"bonate of soda begins to fall or salt down as it is termed." This is removed as it falls; when the gravity of the liquid is observed to increase, "the carbonate of soda is all salted out."

Third. "The separation of sulphur from solutions of potash or "soda salts containing sulphides by means of black oxide or of "finely divided *iron*, as described, whether the said potash or soda "salts be used in the making of prussiates, or for the manufacture of carbonates or other form of potash or soda alkalies."

[Printed, 4*d*. No Drawings.]

A.D. 1854, June 22.—N° 1377.

PRICE, Astley Paston.—"Improvements in the purification of tin, and in obtaining useful products arising from such purification." These are, treating tin which may be "mixed with gold, silver, copper, lead, arsenic, antimony, iron, or tungsten," as follows :—First, subjecting the impure tin to the action of hydrochloric acid and decomposing the solution by ammoniacal liquor or vapours from the same, or ammonia in some shape. The oxide or other compounds of tin may be roasted and reduced. The solution of muriate of ammonia is treated for the muriate by evaporation, "sublimation, or otherwise." If the alloy contained lead the solution is first freed of it by sulphuric acid, and "may then be treated with ammonia."

Second, dissolving "such alloys or mixtures (of tin) as is soluble in hydrochloric acid or is capable of being dissolved by means of a solution of bichloride of tin, and decomposing the solutions thus obtained by means of sulphurous acid," separating "the bisulphide of tin thus formed" from the bichloride of tin solution. The tin may be either precipitated as oxide from this solution by ammoniacal compound, as above, or the solution may dissolve tin from alloys and be converted into protochloride, which may be again treated with sulphurous acid or decomposed by ammoniacal compounds, or with lime, carbonates of lime or magnesia, or sulphite or hyposulphite of ammonia, roasting the sulphides of tin, and reducing the oxides, crystallizing the salt of ammonia.

Third, precipitating the tin from the solution of impure tin in hydrochloric acid by means of lime or carbonates of lime or magnesia, if lead is present first removing it from the solution by means of sulphuric acid. The oxide of tin is reduced.

[Printed, 4*d*. No Drawings.]

A.D. 1854, June 28.—N° 1425.

SCHLŒSING, Theophile.—"Improvements in the manufacture of carbonates of soda." These are, first, producing *bicarbonate of soda in* horizontal cylinders by causing a solution

of chloride of sodium to be agitated in the same by mechanical agitators, whilst carbonic acid and ammoniacal gas are passed into the same. "The excess of gas which passes through the
" cylinders without being absorbed is caused to pass over coke
" moistened with chloride of calcium and hydrochloric acid, by
" which it is retained."

Second, "the use of centrifugal apparatus to separate and wash
" the bicarbonate of soda," "similar to that used by sugar re-
" finers."

Third, "roasting the bicarbonate of soda, and the arrangement
" of apparatus." This is effected in a horizontal cylinder made of sheet iron, closed at both ends, and placed over a fire. In this cylinder is a screw with blades so as to cause the bicarbonate to travel from one end of the cylinder to the other. There is a tube for introducing the salt, and one through which the gases escape and are carried into the cylinders under the first head.

Fourth, "the use of a lime kiln for supplying carbonic acid gas
" and heating the retort."

Fifth, "the operation by which the carbonic acid is separated
" from the liquid;" this is effected by a boiler in connection with an arrangement of cylinders, and the gas, after being deprived of ammonia and water, is conveyed into the cylinders under the first head.

[Printed, 10*d*. Drawing.]

A.D. 1854, July 8.—N° 1504.

JOHNSON, **John Henry**.—(*A communication.*)—"Improve-
" ments in the manufacture of carbonates of soda."

These are, first, "the application and use of fuel gases, or the
" gaseous products arising from the combustion of fuel, for the
" obtainment of pure or nearly pure carbonic acid gas," by applying "the said fuel gases under pressure to soda and potash, and
" to the carbonates or solutions of these matters, so as to form
" highly carbonated compounds, from which pure or nearly pure
" carbonic acid gas is evolved by the agency of heat."

Second, "the application and use of fuel gases in procuring
" comparatively pure carbonic acid gas, by applying the said fuel
" gases under pressure to water or to solutions, so that compara-
" tively pure carbonic acid gas may be obtained when the water
" is withdrawn and released from pressure, or when such impreg-
" nated water *or solutions* are heated."

Third, "the application and use of fuel gases under pressure," directly to the "decomposition of the salts of soda by the re-" action of ammoniacal compounds," such pressure "being about " sufficient for the production of such an atmosphere of carbonic " acid gas as shall prevent any material volatilization of " ammonia."

Fourth, "the application of condensers," for "the absorption " or condensation of any ammonia contained in the gases evolved " by the decomposition of the soda salt by ammoniacal com-" pounds," as well as for "the absorption or condensation of any " ammonia contained in the aeriform matter evolved from such " decomposing process, or from any products obtained by such " process."

These "condensers" are "permeable columns or towers as used " by alkali makers as condensers for muriatic acid."

[Printed, 6*d*. No Drawings.]

A.D. 1854, July 15.—N° 1561.

HUNT, William.—(*Letters Patent void for want of Final Specification.*)—" Improvements in utilizing certain compounds pro-" duced in the process of galvanizing iron, and in the application " of the same and similar compounds to certain useful purposes." These are, first, "in coating iron with zinc," employing "chloride " of zinc as a flux instead of using sal-ammoniac;" or "chloride " of zinc with a little sal-ammoniac may be used."

The "chloride of zinc being skimmed off occasionally" is dissolved from the oxide by boiling with water; the chloride is obtained by evaporating the solution. " In the event of the oxide " being contaminated with chloride of zinc" adding "caustic " lime to decompose it," and washing out "the muriate of lime." " The oxide may be used for making metallic zinc in the usual " way, or it may be used for other purposes."

Second, steeping "the iron (to be coated) in a solution of " chloride of zinc," and drying it "before dipping into the melted " metal." "When the iron to be coated is steeped in dilute " sulphuric acid sulphate of iron is formed to a considerable ex-" tent;" this solution "is thrown away as useless," but it is proposed to evaporate this solution in a lead pan or otherwise, and distil the residue in a close furnace admitting a little air, " send-" *ing the acid fumes* into a condenser filled with pebbles, and a

" little water is added from time to time to assist the condensa-" tion. The sulphuric acid thus obtained may be used again for " cleansing iron."

[Printed, 4*d*. No Drawings.]

A.D. 1854, July 15.—N° 1563.

WAGSTAFFE, MATHEW FRENCH, and PERKINS, JOHN WILLIAM.—"Improvements in obtaining metals from ores and " oxides." These are, in reference to this subject, "breaking or " crushing the sulphurets of metals, and roasting at a red heat in " a common reverberatory furnace, drawing therefrom into the " respective acids in a red-hot state," to reduce the metals speedily " to a solution." Carbonate of soda or potash may be used to precipitate the metals as carbonates; the remaning solutions of neutral salts (" as nitrates of soda or potash, &c.") may be applied to "commercial purposes."

See Abridgements of Specifications upon electricity and magnetism.

[Printed, 4*d*. No Drawings.]

A.D. 1854, July 24.—N° 1623.

CASTETS, AUGUSTE.—"The extraction of a substance for " supplying the place of quinine." This is effected "from the " seeds of the plant called cumin," as follows:—The seeds are boiled in water, the solution concentrated, and litharge added until the liquid is no longer acid. " The oxide of lead is partially " precipitated by sulphuric acid," "the filtered liquid evaporated " to dryness, and the residue treated with alcohol, which dissolves " more than half of the cumin." "The alcoholic solution evapo-" rated to dryness, the precipitate is redissolved in distilled water," and acid added, and then ammonia in excess precipitates "the " pure cumin or artificial quinine." The sulphate is formed by treating it with sulphuric acid, to employ profitably the other half which is not dissolved by the alcohol, it is treated with sulphuric acid and evaporated; the sulphate is obtained. Or, to obtain a purer article, after having treated it with acid, the soluble salt is decomposed by ammonia in excess, and the pure base which is precipitated may be dissolved in sulphuric acid. " To obtain the " base or the sulphate very pure, it should be submitted to succes-" sive crystallizations."

[Printed, 4*d*. *No Drawings.*]

A.D. 1854, July 25.—N° 1632.

SPENCE, PETER.—" Improvements in obtaining sulphur from " iron pyrites and other substances containing sulphur, and in " apparatus for effecting the same." These are, first, " causing " the sulphurous acid gas obtained from pyrites and other " matters containing sulphur by burning to be conveyed through " coke, charcoal, or other solid carbonaceous or deoxidizing " matters kept at a red heat, but not subjected to combustion by " the admission of air."

Second. " The peculiar apparatus," by which " the sulphurous " acid gas is conveyed in a stoneware or other pipe or vessel con" taining " the " deoxidizing matters, heated by the combustion " of the substance from which the sulphurous acid gas is ob" tained." A pyrites kiln is described in the centre of which is " a stoneware pipe, 12 or 15 inches in diameter, open at top and " at bottom, being in connexion with an opening formed in the " kiln for withdrawing the coke or charcoal when partly con" sumed, this opening being closed at other times; and at the " other side of the kiln is an opening for conveying the gases and " vapour of sulphur," through a flue into a brick chamber or vessel in which the sulphur is deposited.

[Printed, 6*d*. Drawing.]

A.D. 1854, July 25.—N° 1633.

BELL, THOMAS, and SCHOLFIELD, HENRY.—" Improve" ments in the manufacture of borax." These are, " treating " the mineral borate of lime in such manner as to separate the " lime and other matters therefrom and the combining such " mineral with soda." The mineral borate of lime in a powdered state is boiled in as much water as will cover it, adding by degrees oil of vitriol of commerce in certain proportions, and boiling for about an hour, the liquor is filtered or drawn off " and the boracic " acid crystallized out; or it is preferred to add to the liquor crystals " or dry carbonate of soda in certain proportions and boil for an " hour, and allow the whole to stand and draw off or filter the " clear liquor, and evaporate it until a pellicle forms, when the " borax or borate of soda is to be crystallized out in the usual " way." Muriatic or oxalic acid " may be used to neutralize the " alkaline and earthy matters in place of sulphuric acid." The *mineral borate of* lime may be treated direct by boiling in water with the crystals or dry carbonate of soda without first neutralizing by acid, but such process it is believed is not "so advantage-" ous as that first described."

[Printed, 4*d*. No Drawings.]

A.D. 1854, September 8.—N° 1967.

LAMING, Richard.—(*Provisional protection refused.*)—" Im-" provements in purifying gas from ammonia and other impurities, " in obtaining ammonia and certain salts of ammonia and soda, " and in treating certain salts of ammonia." These are, first, " to " the use of a rotating sieve for distributing liquids in gas puri-" fyers, and to the purifying of gas from ammonia, by liquids " repeatedly returned to the purifyers with successive additions " of sulphuric acid."

Second. " To the purifying of gas from its carbonic and hy-" drosulphuric acids and ammonia, by a systematic application " of water, and a suitable hydrosulphate of ammonia."

Third. " To the obtaining of ammonia and hydrosulphate of " ammonia in a state suitable for purifying gas, by decomposing " any ordinary hydrosulphate of ammonia by oxide of iron or " other cheap metallic oxide."

Fourth. " To the obtaining of ammonia and hydrosulphate of " ammonia in a state suitable for purifying gas simultaneously " with carbonate of soda, by decomposing in heated retorts or " chambers a mixture of a carbonate of ammonia and sulphuret " of sodium with or without oxide of iron or other cheap metallic " oxides."

Fifth. " To the heating of certain carbonates of ammonia for " producing and purifying sesqui-carbonate of ammonia, and to " the consolidation of certain salts of ammonia by pressure as a " substitute for sublimation."

[Printed, 4*d*. No Drawings.]

A.D. 1854, September 12.—N° 1984.

LAMING, Richard.—(*Provisional protection only.*)—" Improve-" ments in purifying gas from ammonia and other impurities, and " preparing pure gas for burning, in obtaining ammonia and " certain salts of ammonia and soda, and in treating certain salts " of ammonia." *These are*, first, " removing odorous compounds

" from impure gas, and adding to deodorized gas odours less " objectionable than those which have been removed."

The gas is purified " from ammonia and certain acids, by means " of water and ammonia partly saturated with hydrosulphuric " acid, which ammonia may be obtained at very little cost, by a " process herein-after explained."

Sometimes the ammonia is removed by liquids repeatedly returned to the purifiers with successive additions of sulphuric acid, and there should be introduced into pure gas " odours obtain- " able from boghead coal, peat, factitious oil of almonds, or " other suitable substances, and without which its use would be " attended by danger of explosion from leakage."

Second. " To a process for obtaining at a cheap rate ammonia " sufficiently free from hydrosulphuric acid for the above pur- " pose, the said process simultaneously yielding carbonate of " soda. This process consists in heating a mixture of a carbon- " ate of ammonia and sulphuret of sodium with or without oxide " of iron or other cheap oxide, according to the nature of the " carbonate of ammonia which is used, or in heating a mixture " of sulphuret of ammonia or of sodium, and a suitable oxide."

Third. " To the use of a rotating sieve for distributing more " equally the purifying liquids in gas purifiers."

Fourth. " To preparing certain salts of ammonia for the market, " which is done by submitting them to a high temperature in " their purification (instead of using costly chemical re-agents), " and consolidating them by the application of mechanical pres- " rure in lieu of the ordinary chemical sublimation, by which " means the use of ammonia is rendered sufficiently economical " for gas purifying."

[Printed, 4*d*. No Drawings.]

A.D. 1854, September 22.—N° 2047.

SPENCE, Peter.—" Improvements in obtaining sulphur from " iron pyrites and other substances containing sulphur." These are, " the production of sulphur by combining in one chamber " pyrites or other matters containing sulphur with coke, charcoal, " or other solid carbonaceous or deoxidizing matters kept at a " red heat." The kilns, ordinary pyrites kilns, are " lighted by a " charge of burning coals and pyrites, and are charged every two " *hours with* about sixty pounds weight of pyrites in pieces," spread on the surface, " on the top of each fresh charge of " pyrites," spreading regularly " about fifteen pounds weight of " coke or charcoal, or peat charcoal, in pieces." The doors are " luted up so as to admit no air." The sulphur is condensed, as described in N° 1632, 1854.

[Printed, 4*d*. No Drawings.]

A.D. 1854, October 3.—N° 2119.

BLYTHE, William, and KOPP, Emile.—" Improvements in " the manufacture of soda ash and sulphuric acid." These are, first, fluxing together sulphate of soda, oxide or carbonate of iron, the oxide preferred, and coal slack in proportions, which may vary, " but not less than five parts of pure anhydrous peroxide of " iron for every nine parts of pure anhydrous sulphate of soda in " the mixture." In place of coal slack other " carbonaceous fuel " may be used." The mixture when fluxed is drawn from the furnace into a waggon, and when cool is crumbled up by submitting it to a damp atmosphere, when it rapidly absorbs carbonic acid; this is best done on an iron grating. To hasten the crumbling, it may be enclosed in a chamber, and submitted to carbonic acid and steam, and the result lixiviated, and the solution may be crystallized or " dried into soda ash."

Second. This residuum after lixiviation is sulphuret of iron and is drained until it is stiff, and dried in the air or in a stove, and is calcined in " a similar manner as iron pyrites," preferring to employ " an oven similar to those now in use for drying and " finishing salt cake or sulphate of soda," divided into two compartments. " The working of the chambers and the use of nitre " for the purpose of converting the sulphurous acid gas into " sulphuric acid, is the same as when ordinary pyrites is used in " the manufacture of sulphuric acid." The oxide residue can be used over again.

[Printed, 4*d*. No Drawings.]

A.D. 1854, October 9.—N° 2161.

SHANKS, James.—(*A communication from Robert Von Seckendorf.*)—" An improved mode of manufacturing sulphuric acid." This consists, first, in " the decomposition of sulphate of lime, " whether native or artificial, by means of chloride of lead." Gypsum, or anhydrous sulphate of lime in powder, is placed in a large vat with chloride of lead in certain proportions, and water added at about 130° F.; or the water may be added at the ordinary temperature and heat applied, and the whole well mixed. The chloride of calcium in solution is decanted from the sulphate of lead precipitated.

Second. "The decomposition of sulphate of lead," obtained as above by means of hydrochloric acid "for the purpose of obtaining " free sulphuric acid." "To get a full decomposition of the sul- " phate of lead," it is "desirable to use rather more than its " equivalent of hydrochloric acid," raising the whole to a temperature of about 140° F. The chloride of lead is separated, and may be used over again with a similar quantity of gypsum. The solution of sulphuric acid and washings are evaporated.

[Printed, *4d.* No Drawings.]

A.D. 1854, October 25.—N° 2270.

HENDERSON, William.—"Improvements in treating certain " ores and alloys, and in obtaining products therefrom." These are, in reference to this subject, "separating and obtaining" "the " oxides or salts of arsenic, antimony, tin, and several other metals " from zinc, copper, lead, silver, gold, and other metals whose " chlorides are not volatile at a low red heat." Also "the manu- " facture of chloride, oxide, or carbonate of zinc." The ore is first analysed; if found to contain a large proportion of sulphur, it is calcined as described in N° 1672, 1853, until "the proportion " of sulphur is reduced as nearly as possible to half the amount " of all the metals contained in the ore, reckoning all except " iron;" then moistened and exposed to the air for a few days, and ground. When an ore is found to contain "the proportion " of sulphur indicated above, it is at once reduced to powder " without the previous calcination, but when it is found to con- " tain less than the requisite amount of sulphur, sulphur must be " added." This is done by mixing "with an ore richer in sul- " phur, or by adding iron pyrites, or preferably by adding sul- " phuric acid to the powdered ore." The ores prepared as above are mixed in preference with common salt and an oxydizing agent, in preference nitrate of soda. "The mixture must be carefully " and incessantly stirred, especially in the bottom bed; from 12 " to 18 hours on each bed will, if properly managed, be sufficient " to decompose the ore," the furnace being the same as in N° 1672, 1853. Arsenic and iron, &c. are volatilized as chlorides, and *are condensed* by steam or water. "All the other metals with the

" silica and some oxide of iron remain in the furnace as chlorides " and sulphates." The calcined ore while hot is put into boiling water, and the hot solution is treated with moist carbonate or oxide of zinc, and evaporated; the alkaline salts crystallize out, leaving chloride of zinc in solution, from which carbonate or oxide of zinc is precipitated by carbonates or hydrates of the earths or alkalies.

" Separating from each other the deposited oxides of arsenic " and zinc" by converting them into sulphates by sulphuric acid, drying them and calcining them with twice their weight of common salt or other alkaline chloride at a low red heat. Chloride of arsenic is volatilized and condensed; the "chloride of zinc and " sulphate of alkali which remain in the furnace" are "afterwards separated by solution and crystallization as already " described." The "oxides of arsenic and zinc can be obtained " in great purity from these solutions by precipitating with lime " or alkali."

[Printed, 4*d*. No Drawings.]

A.D. 1854, October 27.—N° 2291.

PRICE, ASTLEY PASTON.—"Improvements in the calcination " and oxidation of certain metallic, mineral, and metallurgical " compounds, and in the apparatus and means for effecting the " same." These are, "the employment, for the purposes herein- " before mentioned, of revolving tubes or retorts heated externally " and so arranged as to admit into their interior air or steam " highly heated or otherwise, free from the products arising from " the combustion of fuel employed in the heating of such revolv- " ing retorts or tubes or of their contents, and to allow of the " exit of the products of the oxidation or calcination." "The " compounds, which with others may with advantage be sub- " jected to the process of calcination or oxidation in the before- " mentioned revolving retorts or tubes, are some of the metallic, " mineral, and earthy sulphurets, antimoniurets, and arseniurets, " the oxides or compounds of the metallic oxides, oxidizable " metals, or their oxidizable oxides."

[Printed, 1*s*. Drawings.]

A.D. 1854, October 30.—N° 2307.

WRAY, LEONARD.—(*Provisional protection refused.*)—" A new " manufacture of *sugar* and other products ordinarily obtained

" from saccharine matters." This consists in "obtaining from " the plant botanically known under the name or title of holcus " saccharatus or holcus saccharatum, and on the coast of Africa " by the name of 'imphee,' a saccharine juice, and in manufacturing therefrom syrup, molasses, treacle, and crystallized " sugar;" also, "vinegar, alcohol, &c."

[Printed, 4*d*. No Drawings.]

A.D. 1854, November 10.—N° 2395.

RANSOME, Frederick.—(*Provisional protection only.*)—"An " improvement in preparing oxides and carbonates of lead or zinc, " and carbonate or sulphate of barytes, to render the same " suitable for painting or coating surfaces." This consists in " grinding and mixing oxides and carbonates of lead or zinc and " carbonate or sulphate of barytes with soluble silica, which compound will be found very valuable for coating or painting over " surfaces, whether they be used alone or have mixed therewith " coloring or other matters."

[Printed, 4*d*. No Drawings.]

A.D. 1854, November 15.—N° 2421.

NEWTON, Alfred Vincent.—(*A communication.*)—"An im" proved mode of manufacturing soluble silicates."

This consists in "the employment for this purpose of powdered " slag from furnaces and felspar, and exposing the same in heaps " with lime and soda and water for a sufficient time to effect the " formation of the soluble silicates." "The mode of mixing or " combining is as follows:—200 lbs. or thereabouts of quicklime " are slacked upon the floor or bed; 100 lbs. or thereabouts of " soda are then thoroughly incorporated with the lime by a " shovel or other means; 700 lbs. of powdered slag are then " added, and the whole thoroughly mixed and made into a heap. " The heap is kept wet by sprinkling water upon it daily, and at " the end of a month more or less the process is completed."

[Printed, 4*d*. No Drawings.]

A.D. 1854, November 16.—N° 2428.

FONTAINEMOREAU, Peter Armand, le Comte de.—(*A communication.*)—(*Provisional protection only.*)—"Improve" *ments in obtaining* alcohol, alcoholic, and acetous products."

These are, applying to some part of the oven employed in the baking of bread, &c., "a shield, provided with a pipe, communi-" cating at one end by an orifice with the inside of the oven, and " the other end with a condensor."

[Printed, 4*d*. No Drawings.]

A.D. 1854, December 14.— 2632.

EVANS, Llewellyn William, and McBRYDE, James.—" Certain improvements in the burning of sulphuret ores for " making sulphuric acid and for smelting." These are, in burning iron and copper pyrites, combining with a kiln of the ordinary " construction to that in general use" a " blast pipe or pipes in-" troduced into it, whereby a blast of atmospheric air is driven " by a fan or other well-known mechanical agents into the charge " of ore under treatment sufficient to permeate the mass" and " a " sliding grate at the bottom to facilitate the removal of the " oxides after the burning or roasting."

[Printed, 6*d*. Drawing.]

A.D. 1854, December 18.—Nº 2663.

VON SECKENDORFF, Robert.—" Improvements in concen-" trating and distilling sulphuric acid." These are, first, " the " substitution of iron vessels or apparatus instead of lead, glass, " and platinum hitherto employed in the concentration and dis-" tillation of sulphuric acid." Preferring to use " cast-iron retorts " or stills similar in form to those which are in daily use for the " distillation of nitric and hydrochloric acids."

Second. " Adding to the crude sulphuric acid, sulphate of lead, " sulphate of lime, and common sand, or other suitable material " which will not decompose sulphuric acid at a high temperature." In preference, these substances are added until " the whole becomes " a thin pasty mass." When heat is applied " a quantity of " weak acid comes over which may be returned to the chambers " or boilers; a quantity of sulphurous acid and nitrous acid fumes " also escape from the retort during the concentrating and dis-" tilling processes." These gases are conveyed into a chamber to form sulphuric acid. The sulphuric acid is also " converted into " vapour by the heat of the retort, and is to be conveyed into a " proper cooler and receiver by suitable pipes either of glass, earthenware, or platinum."

[Printed, 4*d*. *No Drawings.*]

A.D. 1854, December 18.—N° 2668.

JOHNSON, JOHN HENRY.—(*A communication from Obadiah Rich.*)—" Improvements in the extracting tannic acid from leather " and in preparing the leather for the manufacture of glue." These are, chopping the leather into small pieces, washing it with water " to remove the dirt and a part of the coloring matters," and digesting it " in a caustic alkali either of ammonia, potash, or " soda," but " soda is preferred, as it is much the cheapest;" the gravity of the alkali and time of digesting are specified; the leather is pressed or submitted to a centrifugal machine to remove all moisture; the liquor is acidulated to liberate the tannin when employed in tanning new skins; the liquor may also be used in dyeing " or other processes in which tannin is employed." The chopped skins are submitted to a second digestion with alkali, washed thoroughly, digested in dilute acid for a specified time, then put into a dilute solution of carbonate of soda, and again " well washed; are then ready to be converted into glue by the " usual process of boiling and drying." Although no mention is made of extracting tannic acid from other than leather in the Provisional Specification, in the Final Specification it is stated that " tannic acid may be extracted from oak, hemlock, and other " kinds of bark, by subjecting them to the action " of an alkali. Tannate of the alkali is formed, and chloride of calcium added, precipitates the tannic acid as tannate of lime which is washed and dried. To use this precipitate, water is added to it " acidulated " with sulphuric, oxalic, or other suitable acid."

[Printed, 4*d*. No Drawings.]

A.D. 1854, December 22.—N° 2700.

MARGUERITTE, LOUIS JOSEPH FRÉDÉRIC.—" Improvements " in the manufacture of sulphuric acid." These are, first, " applying the action of phosphoric acid upon sulphate of lime, " barytes, magnesia, and similar bases, to the manufacture of " sulphuric acid."

Second. " Applying the action of chlorhydric acid upon sulphate of soda, potash, or lead to the manufacture of sulphuric " acid."

Phosphate of lead, " easily procured by boiling phosphate of " lime with chloride of lead, is decomposed by means of chlorhydric acid, chloride of lead being formed," and setting the *phosphoric acid* at liberty. The phosphoric separated " is mixed,

" evaporated, and calcined with a determinate quantity of plaster " of Paris or sulphate of lime, and sulphuric acid is thus obtained " by distillation, besides phosphate of lime remaining as a fixed " residue." " Chloride of magnesia" calcined with clay or argil yields "the greater portion of chlorhydric acid" contained in it.

[Printed, 4*d*. No Drawings.]

A.D. 1854, December 22.—N° 2701.

MARGUERITTE, Louis Joseph Frédéric.—" Improvements " in the manufacture of caustic and carbonated potash and soda." These are, first, " preparing sulphate of potash and of soda in a " continuous manner, and without free sulphuric acid, by calcin- " ing sulphate of lead with chlorides of potassium and of sodium, " and by regenerating the sulphate of lead." When sulphate of lead and chlorides of potassium or sodium are heated together in a furnace, with a current of air or steam, chloride of lead formed and condensed is brought "into contact with sulphate of lime or " any other soluble sulphate capable of regenerating the sulphate " of lead."

Second. " Preparing in a continous manner pyrophoshates and " metaphosphates of potash and of soda, either by calcining " pyrophosphate and metaphosphate of lead and of zinc with " the chlorides of potassium and of sodium, or by decomposing " phosphate of lime by sulphuric acid, and also phosphate of " lead by chlorhydric acid; and also the method of regenerating " pyrophosphate and metaphosphate of lead and of zinc by means " of pyrophosphate and metaphosphate of lime and chloride of " lead and of zinc." The precipitate of pyrophosphate of lime is diluted with water and mixed hot or cold with sublimate of chloride of lead or zinc, and the chloride of calcium is got rid of by washing. " The pyrophosphate of lead or zinc which forms the " base of the operation is thus regenerated."

Third. " Preparing caustic potash and soda by merely adding " lime to the pyrophosphate of potash or of soda." The caustic potash or soda may be converted into carbonate of potash or soda by means of carbonic acid or by exposure to the air.

[Printed, 6*d*. No Drawings.]

A.D. 1854, December 27.—N° 2729.

DUNN, John Lang.—" Improvements in working up certain " waste sulphates and nitrates and for the manufacture of useful

" products therefrom." These are, first, the acid solution, after etching surfaces of copper, is diluted "with water until it marks " 56° Twaddell," when half its weight of litharge is added. This mixture is allowed to stand a week, stirring it about a dozen times a day, heating by steam. " When a white deposit of nitrate of " lead forms round the side of the vat this part of the process is " complete." The liquid is drawn off, " molten lead in quantity " equal to that of the litharge used," is added. " After a few " days the liquid becomes of a light straw color." The copper precipitated is washed, " and may be sold as copper or redissolved " to form its salts." "The liquid is evaporated and the nitrate " of lead obtained in crystals in the usual manner."

Second. The acid which has been employed for etching surfaces of iron is treated with strong ammonia in excess. The oxide is washed, dried, and "may be used for painting." "The nitrate of " ammonia is crystallized in the ordinary manner."

Third. The sulphate of lead as it is obtained as a waste product in calico printing is dried, and mixed with a sixth part of its weight of ground coal, and brought to a dull red heat in a reverberatory furnace, by which the sulphate is converted into sulphuret. It is then withdrawn and dissolved in nitric acid, " and the nitrate of " lead thus formed is crystallized in the usual manner."

[Printed, 4*d*. No Drawings.]

1855.

A.D. 1855, January 12—N° 81.

HUNT, William.—(*Provisional protection only.*)—" Improve- " ments in the manufacture of iron." These are, using " the " oxide of iron, which occurs as a residuum from burning sul- " phuret of iron or pyrites, particularly coaly pyrites for making " iron, and sometimes such iron as will be applicable to the " manufacture of steel." In this latter case " a little recovered " oxide of manganese or chloride of manganese " is used. The chloride of manganese " is a refuse product in the manufacture " of chloride of lime, and the oxide is obtained from the chloride " of manganese by evaporation and roasting, and is less costly " *than the* native oxide."

[Printed, 4d. No Drawings.]

A.D. 1855, January 19.—N° 148.

FONTAINE MOREAU, PETER ARMAND LE COMTE DE.—(*A communication.*)—" Improvements in obtaining electro-motive " power." These are, in reference to this subject, the " utiliza- " tion of the products of the battery," as follows:—" The dilute " nitric acid may be concentrated by distillation; nitrate of iron " is obtained when dilute nitric acid is used in combination with " the iron shavings. The sulphate of zinc contained in the zinc " cells can be transformed into chromate of zinc and into hydro- " carbonate." An alkaline base precipitates the oxide from the sulphate; " if lime is taken as base, oxide of zinc is precipitated " as well as the sulphate of lime, which can be separated by " washing" in vats with cloths at the bottom through which passes a continuous stream of water. " If instead of lime a cal- " careous carbonate is employed, such as marble, and the mixture " being carried to the boiling point," " hydrocarbonate of zinc " and sulphate of lime is obtained," by calcining, which with powdered charcoal, " metallic zinc is obtained, which being sub- " limed converts it into oxide of zinc." Sulphuric acid acting on carbonate of lime, " an equivalent of carbonic acid " is evolved, " which can be used in the preparation of aerated waters."

[Printed, 1*s.* 2*d.* Drawing.]

A.D. 1855, January 20.—N° 159.

MARGUERITTE, FRÉDÉRIC.—(*Provisional protection only.*)— " Improvements in the manufacture of soda and of potash." These are, " in the application of oxalic and boric acids to decom- " posing common salt or chloride of sodium or chloride of " potassium." Oxalic acid is mixed in suitable proportions with chloride sodium, and the mixture gradually heated and kept at a gentle heat " until no more chlorhydric acid is evolved." The residue oxalate of soda, in solution or in a moist paste, is mixed with lime, and caustic soda obtained by lixiviation, or it is dried and exposed to carbonic acid, and the mass obtained on lixiviation yields a solution of carbonate of soda, and a precipitate of oxalate of lime, which " being treated " with sulphuric acid forms sulphate of lime, and sets free oxalic " acid, which may thus be used over and over again." " Chloride " of potassium is treated in a similar manner for extracting " potash."

"When boric acid is operated with" the crystallized or hydrated acid, is mixed as above with chloride of sodium or potassium, and calcined in a retort, boric acid and chlorhydric acid are evolved and are condensed; when no more chlorhydric acid is evolved, the molten mass is run out and divides itself into two layers, consisting of borate of soda and chloride of sodium not "acted upon, and may be put again in the retort." The borate of soda thus obtained is dissolved and mixed with lime, borate of lime is precipitated, and caustic soda is in solution, which may be carbonated in any way. The borate of lime is decomposed "by "dissolving it hot in hydrochloric acid," crystallizing out the acid, or by exposing the borate of lime in suspension in water, or otherwise to the action of carbonic acid gas.

[Printed, 4*d*. No Drawings.]

A.D. 1855, January 24.—N° 178.

LAMING, Richard.—"Improvements in obtaining and combining ammonia." These are, first, the extraction of ammonia from coal gas "by the use of pierced and plain shelves or diaphragms, so combined in pairs with a purifying vessel that "while the former serve by their holes to distribute the gas "through the mass of purifying liquid, the latter serve by their "resisting surfaces to prolong the submersion of the so-divided "gas, without a corresponding increase in the depth of the "purifying liquid; also the extraction of ammonia from coal gas "by the use of pierced shelves or diaphragms in purifiers fitted "with valves."

Second. "The use of a scrubber" without "diaphragms, for "extracting ammonia by a continuous process of distillation "from solutions containing it in a volatile state; also passing "the volatile products emitted from any continuous still working "volatile compounds of ammonia into acid in a fluid state, for "combining the ammonia with the subsequent application of the "unabsorbed vapours, to heat fresh portions of liquor about to "enter the still; also the use of a separate vessel connected by "pipes with the distilling scrubber, or any modification of "Coffey's diaphragm still, for decomposing the fixed compounds "of ammonia contained in spent liquor, by means of lime or "magnesia, by the agency of steam on its way to the main "*apparatus*."

Third. Combining ammonia with acid mixtures or compounds of phosphate of lime, by bringing into immediate contact with them ammonia, as it or any of its compounds is eliminated " from " an ammoniacal solution or a salt containing ammonia."

Fourth. " The use of finely levigated raw gypsum for extracting " ammonia from gas containing it, and carbonic acid at any " temperature low enough for the purpose," also for the same purpose the repeated use " of any mixture of sulphate of limes " and inert matter, after either a new addition of the earthy sulphate to the mixture, or the application of a levigating operation " to break down in it the portion of sulphate of lime remaining " undecomposed."

Reference is made to two former patents, No. 2124, 1853, and No. 582, 1854.

[Printed, 4*d*. No Drawings.]

A.D. 1855, January 24.—N° 183.

SCHMERSAHL, AUGUSTUS EDWARD, and BOUCK, JOHN AUGUSTUS.—"Improvements in the manufacture of sulphuric acid, " and in apparatus for effecting the same." These are, first, " the production of sulphuric acid, by causing sulphurous acid " gas to pass, in combination with atmospheric air, through " heated tubes."

Second. " Supplying such tubes with asbestos or other substances, as before mentioned;" these are, " a mixture of copper " and chrome oxides, platinum in wire or sheets, arranged so as " to afford minute passages, coke, prepared pumice stone, animal " or other charcoal, porous matters produced by calcining mixtures of China clay with organic matters, or other porous substances which will offer a partial obstruction to the passage of " the gases, and afford an extensive surface."

Third. " Causing the sulphurous acid gas to pass through " water previously to being combined with atmospheric air."

Fourth. " The general arrangement of the apparatus," " particularly " what is termed " the hydraulic valve."

A pipe leads from the top of the vessel for burning the sulphur into a vessel containing water, through which the gases pass upwards, and are led from this vessel by a tube in the upper part into a tube containing the porous material heated by an ordinary fire. There is *a glass vessel,* through the stopper of which are two tubes, one open at top dips into a column of water, the other leads into the tube with the porous material; another pipe for steam or water enters this tube nearly at the same place. This tube of porous materials is connected with a series of condensers particularly arranged.

[Printed, 8*d*. Drawing.]

A.D. 1855, January 26.—N° 200.

LEESE, Joseph, junior.—" Improvements in the process of " printing calicoes and other textile fabrics." This invention consists, " first, in the recovery of the copper used as a resist " in " indigo blue printing."

Second, " in the substitution of other " resists for " the salts of " copper." " I add sulphuric or any other acid that will dissolve " oxide of copper to the indigo that is washed off the dyed pieces, " and which is known in the trade as 'bowlings,' also submitting " the pieces after the 'bowlings' have been taken from them to " weak sulphuric or other acids; the copper remaining on the " cloth is by this means dissolved off; then filter the indigo from " the solution of sulphate or other acid solution of copper, and " evaporate it till it has attained the strength desired, or is formed " into crystals;" or " zinc or iron " may be added to the above weak solution, " which causes the copper to be precipitated in the " metallic form;" or the copper may be dissolved in 'ammonia.' " " I then separate the ammonia from the copper by means of distillation, and thus recover the ammonia by means of the ordinary " still. I also form other resists (for the purpose of protecting " the pattern from the action of the blue vat or dye), either by " sulphate of manganese, the salts of iron, the sulphurets of the " same two metals, or mixtures of these salts, also of resins dis- " solved either in alkalies or other solvents," as substitutes for salts of copper.

[Printed, 4*d*. No Drawings.]

A.D. 1855, January 30.—N° 231.

POCHIN, Henry Davis.—" Improvements in the treatment of " certain compounds of alumina, and the application of the same " in printing, dyeing, tawing, paper making, and such like pur- " poses." This invention relates to the manufacture and application of a compound which " I term aluminous cake," composed of

" but little more than the silica originally in the clay, and the " sulphate of alumina, formed by the action of the sulphuric acid " on the alumina, and no free or uncombined acid." I take clay composed of various quantities of silica, alumina, iron, and water, or clay without iron when it can be had. I find I can use with advantage and economy that containing about 45 of silica, 37 of alumina, 3 of oxide of iron, and 17·7 of water in 100 parts. " Such clay is partially dried and pounded into powder, then " heated and stirred in a furnace until the whole of the water is " evaporated, and finally sifted through a fine sieve." One ton [of such dried clay] is intimately mixed with 21 cwt. of sulphuric acid, having a specific gravity of about 17·35, and afterwards as much water added as would reduce the specific gravity of the sulphuric acid employed to about 13·50. It is then placed in a leaden or other suitable vessel, and steam or fire applied, being well agitated until it reaches a temperature of 212° Fahrenheit, when the greater part of the sulphuric acid combines with the alumina of the clay, causing a violent action. It is then continued at a boiling temperature for about four hours, so as to ensure the combination of the whole of the acid with the alumina. " The " fire is then withdrawn, and the mass removed and allowed to " cool." " This aluminous cake [which may contain the silica " and a small excess of clay] may be employed in the manufac" ture of the aluminous mordants used by calico printers and " dyers; and in various other processes used by dyers; and in " the preparation of white leather in the process termed tawing; " also in the manufacture of paper, as a substitute for alum, and " the ordinary sulphate of alumina."

[Printed, 4*d*. No Drawings.]

A.D. 1855, February 10.—N° 320.

BELLFORD, AUGUSTE EDOUARD LORADOUX.—(*A communication from Frederic Kuhlmann.*)—" Certain materials to be used for " cementing and painting, and also applicable to printing and " dressing or finishing fabrics." These materials are silicate of potash or silicate of soda, otherwise known as soluble glass. The silicate which it is preferred to use, " as being the most economical " to prepare," " is or may be obtained by heating silica during " six or eight hours in a solution of caustic potash having a " specific *gravity of 1·160* about, the temperature being that cor-

" responding with a pressure of four or six atmospheres;" this is effected in " a strong cylindrical steam boiler." Soda is sometimes substituted for potash; but silicate of soda effloresces, especially if it be not thoroughly saturated with silica.

" The silicate may also be prepared in the dry process." This is effected in a reverberatory furnace, by using " one and one-" third or two parts of silicate [silica ?] to one part of carbonate " of potash," heating " the whole during six or seven hours, till " a complete fusion is obtained." By this process sulphurets may be present in the silicate, which blacken or darken the colours; " but this may be obviated by melting the compound in a crucible, " and adding a small portion of nitrate of potash to the mixture " of silica and potash."

[Printed, 4*d*. No Drawings.]

A.D. 1855, February 15.—N° 340.

BLYTHE, William, and KOPP, Emile.—" Improvements in " the manufacture of soda ash and sulphuric acid." These are, first, " in the use of the oxides or carbonates of manganese, zinc, " copper, and lead, instead of lime or carbonate of lime, in the " manufacture of black ash or crude soda."

Second. The " residue of the sulphurets of these metals " are subjected to an oxidizing and roasting, and " yield sulphurous " acid (which is converted by the ordinary process into sulphuric " acid) and oxides of the different metals, which oxides are again " used for the preparation of a new quantity of metalliferous " crude soda."

The processes are conducted in a manner similar to those described in N° 2119, 1854, to which reference is made, and in which oxide or carbonate of iron is used in place of the above oxides or carbonates.

[Printed, 4*d*. No Drawings.]

A.D. 1855, February 21.—N° 377.

LAMING, Richard.—(*Provisional protection only.*)—" An im-" proved process for combining the purification of gas with the " obtaining of certain valuable products." This invention consists in combining the following operations:—

First. " Bringing water or gas liquor obtained from the ' con-" ' densers,' or other suitable liquid contained in a purifying " vessel or vessels, in contact with a current of impure gas."

Second. " Saturating the ammonia as it accumulates in the " liquid with sulphuric or other desirable acid, introduced to it " under a bell or inverted cup, or other equivalent apparatus " (which may be either placed in a purifying vessel, or form part " thereof, or be otherwise in communication therewith)."

Third. " Conveying away from the upper part of the said bell, " or other equivalent apparatus, the hydrosulphuric and carbonic " acids by a conduit, leading either to a furnace, where they may " be economically disposed of, or to some other suitable locality. " Any excess of hydrosulphuric and carbonic acids over and " above the portions removed by these means may be taken from " the gas by other means efficacious for the purpose."

[Printed, 4*d*. No Drawings.]

A.D. 1855, February 26.—N° 418.

BELLFORD, Auguste Edward Loradoux.—(*A communication.*)—" Certain improvements in the manufacture of soda." These are said to be, first, " the means indicated " below not to " lower the alkalimetrical standard of the soda, notwithstanding " the salts that are mixed with the precipitate of bicarbonate of " soda." The drained bicarbonate (produced by decomposing common salt with bicarbonate of ammonia) is submitted to great pressure, and calcined " will mark from 84 to 85 degrees by the " alkalimeter. To obtain it higher the compressed bicarbonate of " soda is diluted with water and then submitted to a second " pressure," and when calcined " will mark 92° to 93°." " A third " lixiviation followed by a third pressure may be made, and after " calcination the salt of soda obtained will be found to make " 95 degrees."

Second. " The means indicated to separate the salts that remain " in the waters drained off by the before-mentioned pressures;" the waters united are to be distilled.

Third. " Regenerating the bicarbonate of ammoniac;" " to " bring the ammoniac and even caustic solutions to the state of " bicarbonate," producing carbonic acid gas, with the aid of a " lime furnace heated with coke or charcoal;" the gas evolved is made to ascend a column; while, " on the other hand, an ammo- " niac solution is made to descend " from the upper portion of this column, and which on arriving to the bottom is transformed into a bicarbonate of ammoniac.

[Printed, 4*d*. *No Drawings.*]

A.D. 1855, March 3.—N° 472.

HUNT, William.—" Improvements in utilizing certain com-" pounds produced in the process of galvanizing iron, and in the " application of the same and similar compounds to certain useful " purposes." These are, " the use of chloride of zinc in place of " sal ammoniac in coating iron with zinc, and in the use of a " solution of chloride of zinc for steeping the iron in after clean-" ing, and previous to being galvanized." In carrying out the above oxide of zinc is obtained and formed into chloride in the manner described in N° 1561, 1854.

[Printed, 4*d*. No Drawings.]

A.D. 1855, March 7.—N° 510.

WILSON, John, and HORSLEY, John.—(*Provisional protection only.*)—" Improvements in the manufacture of iodine and " iodides, and of a pigment or pigments from certain residual " products in such manufacture." These are, first, " in the " employment of chromates and bi-chromates of the alkalies, " soda, or potash, in conjunction with any mineral acid, for " effecting the precipitation of iodine from its solutions."

Second. " The use of nickel and zinc in the manufacture of " iodides of the metallic bases potassium and sodium."

Third. " The manufacture of a certain pigment or pigments or " enamel colors from the residual liquors."

[Printed, 4*d*. No Drawings.]

A.D. 1855, March 12.—N° 555.

NAPIER, James Murdoch.—" Improvements in the furnaces " used in the manufacture of soda or alkali." These are, constructing a " furnace bottom of a series of shelves or surfaces, " which by their movement cause the materials under process " progressively to be moved from one shelf or surface to the " next shelf or surface, and thus the materials to be dried and " roasted or carbonated may be constantly or at short intervals " received in at one end and delivered out at the other end of a " furnace." The products of combustion having performed their part " pass through, between, and amongst inclined shelves, down " which the matters to be acted on are caused to descend by " mechanical action, and thus will the matters receive a prepara-" tory action of heat before they reach the furnace."

[Printed, 10d. Drawing.]

A.D. 1855, March 23.—Nº 645.

RANSOME, Frederick.—" An improvement in the manufac-" ture of artificial stone." This consists in "the employment " in the manufacture of artificial stone of soluble silicates, the " ingredients composing which have been fused together before " dissolving them." According to No. 10,360, "the soluble sili-" cates" for the above purpose "were prepared and used in the " ordinary manner, that is, got in a state of solution without first " fusing the ingredients together." But according to this the silex and the alkali are "first mixed in a ground state and then " subjected to heat till the whole is fused; the mass is to be " ground and then dissolved." For this purpose mixing together " 5 cwt. of sand and 4 cwt. of soda ash, containing about 50 per " cent. of alkali and ½ cwt. of charcoal;" or mixing " 15 cwt. of " sand, 10 cwt. of potash, and 1 cwt. of charcoal," and exposing " the mixture to heat, and thus form them into a glass, " which " is broken and dissolved" in water at boiling temperature or under pressure of steam. The solution is to be concentrated by evaporation to the specific gravity of about 1700, "and mixed " with sand, clay, or other earthy or mineral substances, and the " articles are to be formed or moulded as heretofore." Or the soluble glass, when ground into fine powder, is mixed with the above substances together with water.

[Printed, 4*d*. No Drawings.]

A.D. 1855, March 26.—Nº 672.

ARMBRUSTER, Carl, and LAIST, Otto.—(*Provisional protection only.*)—" Improvements in the manufacture of sulphate of " soda." These are, combining together pyrites, copper pyrites, " oxide of iron, and muriate of soda (common salt), by heating " them together in a reverberatory furnace until muriatic acid vapors cease to be evolved, when the residue is allowed to cool, " placed in vats, and washed according to the ordinary process. " The lye which results from this operation being saturated with " copper by the copper pyrites of the mixture, iron cuttings are " thrown therein to collect and precipitate the copper." " The " copper pyrites is not indispensable in the manufacture of sul-" phate of soda according to this improved process, but its " employment furnishes a more advantageous product."

[Printed, 4d. No Drawings.]

A.D. 1855, March 31.—Nº 723.

BALMAIN, WILLIAM HENRY.—" Improved methods of or pro- " cesses for recovering oxide of manganese after it has been used " in the manufacture of chlorine." These are, recovering the oxide "in conjunction with the manufacture of muriate or hydro- " chlorate of ammonia," as follows :—" Ammoniacal gas liquor is " run into a tank and chloride of manganese solution is added in " excess ; after standing some hours, the clear liquid is drawn off " and evaporated for the purpose of crystallizing the hydrochlo- " rate of ammonia." The sediment in the tank is agitated with water, the clear liquid again drawn off and evaporated as above. The sediment is drained of water as much as possible, and heated to redness with access of air until it "has become of a black colour," when it is "fit for use in the manufacture of chlorine." " When the manganese is to be used for producing chlorine, it " is advisable to mix lime with the sediment before drainage, or as " soon as it dries," by which it is converted "into manganate of " lime, which increases its power of eliminating chlorine." When the gas liquor is at a distance, or "when the recovered manganese " is to be used for glass making," the solution of chloride of manganese is boiled down, and the residue heated at a temperature that will render oxide of iron insoluble, is redissolved in water, and the solution treated as above with the ammoniacal gas liquor.

"If no lime or alkali waste have been used in neutralizing the " excess of acid" the oxide of manganese "may be recovered an " indefinite number of times."

[Printed, 4*d*. No Drawings.]

A.D. 1855, April 12.—Nº 813.

CUNINGHAME, ALEXANDER. — " Improvements in the " manufacture or production of sulphuric acid and sulphates of " iron and alumina." These are, the production of these substances as follows :—" Alum schist, alum slate, gentle slate " and what is technically known in some parts of Scotland as " 'black stone,' " "all or any of these mineral substances, as well " as such ironstones or coals as contain sulphur" (are applicable) are reduced to powder, made into a plastic mass, and made or *moulded into* balls or brick-like pieces, or "moulded or shaped " *without any liquid* addition, and calcined, not much fuel being

" required, as when dry they usually burn of themselves;" " under the application of heat in this way, sulphur is driven off " from the treated masses under the form of sulphuric and sulphurous acid gases." " If it is intended to make sulphuric acid " only in this way, the heating process is carried on until the " whole of the contained sulphur is expelled" and conducted into " the usual leaden chambers, to form sulphuric acid; but if sulphate of iron or alumina is required, the heat is checked or " reduced at an anterior stage of the action, and the treated bricks " or masses are afterwards removed and lixiviated, when solutions of these salts are obtained."

[Printed, 4*d*. No Drawings.]

A.D. 1855, April 17.—N° 847.

CLAPHAM, Robert Calvert.—(*Provisional protection only.*) " Improvements in the manufacture or production of the salts " of baryta and of artificial iron pyrites, and in the application " thereof in the manufacture or production of salts of soda or " other alkaline salts." These are as follows:—" Sulphate of " baryta, carbonaceous matter, oxide of iron, and any suitable " flux, as carbonate of soda or common salt for example, are " together subjected to the action of heat in any convenient " manner. The fluxed mass is lixiviated in water;" the products are caustic baryta in solution, and sulphuret of iron as a residue. " The sulphuret of iron is either burnt to produce sulphuric " acid" or employed " to produce sulphate of soda and oxide of " iron" by decomposing common salt " by any convenient " method." The solution of sulphate of soda is decomposed by a " solution of caustic baryta producing caustic soda and sulphate " of baryta." " The caustic soda is treated in the ordinary" or other way " for the production of the finished article, whilst the " sulphate of baryta and the oxide of iron are re-applied for the " purpose herein-before referred to."

[Printed, 4*d*. No Drawings.]

A.D. 1855, April 25.—N° 938.

FRANKLAND, Edward.—" Improvements in the treatment of " certain salts, commonly called alums, to obtain products therefrom." These are, " the separation of the aluminous constituent from the alkaline constituent of completely or partially

" manufactured alums by the application of ammonia or carbon-
" ate of ammonia, or of a caustic or carbonated alkali, so as to
" conserve and utilise the alkaline constituent of such alums."
The alums are dissolved in water, and "alkali or carbonated
" alkali added" and the aluminous precipitate is converted "into
" neutral sulphate of alumina by adding the requisite quantity of
" sulphuric acid." The liquid separated from the aluminous precipitate contains alkaline sulphates, which are obtained by
" evaporation and crystallization." When operating upon ammonia alum in preference, "steam charged with ammoniacal gas
" is passed into a solution of the alum until the liquid is alkaline
" to test paper, the aluminous precipitate is collected on a filter,
" washed, dissolved in sulphuric acid, the solution concentrated
" to a certain point and allowed to cool; the product is sulphate of
" alumina. The sulphate of ammonia liquor is evaporated to
" crystallization. When the solution from the aluminous preci-
" pitate, consists of a mixture of sulphate of potash and sulphate
" of ammonia," "these two salts can be separated from each
" other by crystallization, or the solution can be evaporated to
" dryness," and the mixed sulphates can be used in the manufacture of artificial manures," &c.

[Printed, 4*d*. No Drawings.]

A.D. 1855, May 4.—N° 993.

HORTON, Thomas.—(*Provisional protection only.*)—" An im-
" provement in the manufacture of charcoal and pyroligneous
" acid." This consists, "in the use of spent tan." The tan is distilled in an apparatus, and "the pyroligneous acid is obtained in
" the volatile products which distil over." The charcoal remains behind in the retort. The "spent tan may be heated in a furnace or
" kiln, and the volatile products allowed to escape, if the object of
" the manufacture is to procure charcoal, to the neglect of the
" pyroligneous acid."

[Printed, 4*d*. No Drawings.]

A.D. 1855, May 8.—N° 1025.

HUGHES, Joseph.—" Improvements in the manufacture of
" paper." These are, first, "the application and use of sulphate
" of alumina, instead of the alum of commerce, in the manufac-
" ture of paper." Second, "the application and use of the
" precipitated sulphur of barytes for the same purpose." Third,

" the application and use of the precipitated sulphate of barytes " and alumina " for the same purpose.

In preparing sulphate of alumina, " 1000 lbs. of brown sul- " phuric acid, about 150 degrees Twaddel's hydrometer," are mixed with " about 750 lbs. of pipeclay of commerce," allowed to stand for about twenty-four hours, when they are heated in a reverberatory furnace until the desired effect is obtained. The rough product of sulphate of alumina is withdrawn from the furnace and dissolved by the aid of steam or otherwise, " until " each gallon of liquid contains 2½ lbs. of supersulphate of " alumina." When the sediment subsides the clear liquid is treated with cream of lime or chalk until the liquid shows upon litmus paper " a pale red color ;" after subsidence " the liquid " sulphate of alumina may be applied to the paper pulp."

Sulphate of barytes is obtained by adding to every 1,000 lbs. weight of the ground or pulverized sulphate about 350 lbs. weight of coal, and heating them in a close furnace to a bright red heat until the sulphate of barytes is converted into a sulphuret. The sulphuret of barium is dissolved out by the aid of water. Also, taking salt cake or sulphate of soda and roasting off any excess of acid it may contain in a reverberatory furnace, dissolving it, neutralizing any excess of acid by cream of lime. If iron shows blue by prussiate of potash, " more lime must be added until it " becomes pure." This solution of pure sulphate of soda is added to the solution of sulphuret of barium until all is precipitated as sulphate of barytes. The solution of sulphuret of sodium is withdrawn, evaporated " in a white ash furnace," adding for " every " 100 lbs. of wet salt about 20 lbs. of dry deal sawdust, stirring " until the sulphur is removed from the soda." " Then the soda " ash must be withdrawn from the furnace." The precipitated sulphate of barytes is perfectly washed and is fit to be applied to the pulp. Another mode of obtaining precipitated sulphate of barytes is to add to the solution of sulphuret of barium oil of vitriol diluted with three waters, and washing the precipitated sulphate of barytes.

Another method of applying sulphate of barytes in a precipitated form to the aforesaid purpose is to add to sulphate of alumina, when freed from iron by the use of prussiate of potash, sulphuret of barium until all the barytes is precipitated, and washing the double precipitate.

[Printed, 4d. No Drawings.]

A.D. 1855, May 11.—Nº 1062.

JOHNSON, John Henry. — (*A communication from Jean Francois Persoz.*)—" Improvements in the manufacture of sul-" phuric acid." These are said to be, first, " the peculiar system " or mode of manufacturing sulphuric acid and sulphates." In oxidizing sulphurous acid into sulphuric acid the first process " consists in directing the sulphurous acid through nitric acid " heated to a temperature of about 100° and previously diluted " with from four to six times its volume of water; or the sul-" phurous acid may be directed through a mixture of nitric and " muriatic acid." " The second process, which consists in the " oxidation of nitrous vapour or chloro-nitrous acid, and trans-" forming it into nitric acid, by means of the oxygen obtained " from the atmosphere or from any other source." " In oxidizing " nitrous vapour, and reconverting it into nitric acid at the same " time that it is decomposed, it is proposed to turn to account the " well-known fact, that in several experiments performed in the " presence of water or its vapour, four volumes of nitrous vapour " and one volume of oxygen will combine and form nitric acid. " This may be effected either in the same chamber where the " sulphurous acid is oxidized, in order to accumulate the strong " sulphuric acid, or in a chamber communicating therewith when " oxidation can no longer be accomplished in the first chamber." " By this system or mode of manufacturing sulphuric acid, the " leaden chambers hitherto employed are dispensed with." " Sulphurous acid gas disengaged by any other reactions capable " of producing it, may also be employed, either pure or mixed " with nitrogen, carbonic acid or oxide, and hydrogen," and a number of methods are given, some of which are described under the third head.

" By this process also the nitrates of potash and soda, and the " chlorides of the same, may be converted into sulphates of potash " and soda." Both being dissolved, to the solution of the nitrates muriatic acid is added, and to the chlorides nitric acid, " so as to " develope in each case the chloro-nitrous vapour." After the sulphurous acid has been passed into these solutions sufficiently to convert " into a sulphate the entire base of the nitrate or chlo-" ride employed," they are distilled to expel hydrochloric and nitric acids. This process, described for the alkalies, " may be " applied with equal success to any other nitrate or chloride."

When the sulphurous acid from roasting sulphurets is used the arsenious acid evolved should be condensed "in proper chambers "before directing the sulphurous acid through the nitric acid."

Second. "The general construction and arrangement of apparatus for manufacturing sulphuric acid and sulphates." The apparatus preferred consists of "three distinct parts," first, a retort or chamber for the production of the sulphurous acid, which varies with the nature of the material employed; second, a mixing chamber with the diluted nitric acid, &c. "kept constantly agitated "by an agitator," which is "driven from the outside at a convenient speed;" third, "a chimney containing porous material, "in which all the gaseous bodies which have escaped the reaction "produced in the second part enter by openings," and "complete "their mutual action." "The chimney receives a jet of water at "its upper part," which carries down any nitric acid and sulphuric acid into a basin fixed underneath. Before the sulphurous acid passes from the retort or chamber into the mixing chamber it passes through an intermediate vessel called "an indicator," in which is "a vertical air tube," "which is furnished with a cork to "introduce such a quantity of air as will contain a volume of "oxygen equal to about half of that of the sulphurous acid "supplied from the retort," and before the gases pass from the chimney they are drawn into a second chimney containing porous material and a jet of water with vessel underneath, and out by a tube at the bottom of the chimney "by means of an exhausting "machine in communication therewith."

Third. "Extracting sulphur and various metals, but more "especially copper, iron, lead, and antimony." When sulphurous acid gas and sulphuretted hydrogen together are brought into "contact with water or its vapour," they "mutually decompose one "another," forming sulphur, sulphuric acid, and hyposulphurous acid, which is again decomposed by heat "into sulphur, sulphurous, and sulphuric acids, or which, treated with nitric or nitrous "vapour, is immediately transformed into sulphur and sulphuric "acid." The cases are stated when "it is proposed to apply "these reactions."

Sulphurous acid is produced "by the reaction of the sulphates "of iron, zinc, or copper, either upon charcoal and certain organic "matters or upon hydrogen," carbonic oxide, or the "carburets "of hydrogen, either gaseous, liquid, or solid," using a proper temperature so as to form "sulphurous acid gas;" and leave "the

" metal or possibly a metallic oxide, which can by the addition of " a proper quantity of charcoal and heat be converted into metal." Sulphate of copper heated " to about 220° or 250° in a current of " hydrogen, or of hydrogen more or less carburetted," the result is sulphurous acid and carbonic acid, leaving the metal.

[Printed, 8*d*. Drawing.]

A.D. 1855, May 22.—N° 1154.

HOLLAND, Homer.—" Improvements in the method of treat- " ing metalliferous sulphurets." These are, " the use of nitrate " of soda in the dry process of resolving and assaying " " various " metalliferous sulphides," also in transforming " the auriferous " and argentiferous leads or ores known as galena, into soluble " and insoluble sulphates of silver and lead " and " thus extract- " ing both its gold and silver," likewise in producing " the " sulphate of copper and its oxides from its various sulphides," and in manufacturing of " sulphuric acid from the several and " various metalliferous sulphides." The nitrate of soda and metalliferous sulphide, both pulverized, are mixed together in certain proportions; one-third of this mixture is deflagrated in a large cast-iron basin, and the remaining two-thirds added, at intervals of about half-an-hour, with stirring; " the sulphurous, " sulphuric, and nitrous oxide, and acid fumes," are passed with steam " into a sulphuric acid chamber," the heat being maintained until the sulphuric acid is all expelled. The mass on cooling is " lixiviated, to remove the soluble sulphates in copper, iron, and " others by water, and in argentiferous galena by sulphuric acid." The inert compounds remaining allow of the complete amalgamation of the gold or gold and silver. In some instances, especially with bisulphides, the pulverized ore is first roasted. With copper pyrites the cooled mass is lixiviated with hot water, to remove sulphate of soda and copper; from this solution the copper may be precipitated " by scrap iron or zinc, or concentrated and " crystallized out with the soda, and afterwards separated," " the " oxides of iron and silex, and suboxide of copper," undissolved, reduced to the metallic state.

[Printed, 4*d*. No Drawings.]

A.D. 1855, May 25.—N° 1188.

***ALLEN, John*, and ALLEN, William.**—" An improvement in " *applying heat to* alkaline solutions, and to drying and making

" alkaline salts." These are, " the evaporation to dryness of " solutions of caustic soda, carbonate of soda, or soda ash, and " sulphate of soda," by applying the waste heat of coke ovens either to the surface in contact with the liquor or exterior of the pan or vessel containing the solutions to be acted upon by any number of ovens. In preference, the flame is passed " over the " surface of the solutions to be evaporated to dryness," by " means of the draught of a chimney."

In the Provisional Specification this mode of applying heat, it is said, may also be used when " making sulphate of soda, by " roasting ores containing sulphur with common salt."

[Printed, 6*d*. Drawing.]

A.D. 1855, May 31.—N° 1243.

DUNLOP, Charles Tennant. — " Improvements in the " manufacture of chlorine." These are, first, " the system or " mode of manufacturing or producing chlorine from the oxide " of manganese derived from the chlorine manufacturers' residua " matter, by first producing an artificial carbonate of manganese, " and then transforming such carbonate into oxide by the agency " of heat and air."

Second. " The manufacture or production of oxide of manga- " nese from the residuum of the chlorine manufacture, by first " producing the carbonate of manganese, and then heating the " same in contact with atmospheric air." " The carbonate of " manganese may be obtained by precipitation from the chloride " of manganese by the agency of carbonate of ammonia." The muriate of ammonia may be sold or employed as such, or it may be re-transformed into carbonate. Carbonate of manganese is also " obtained by passing carbonic acid through the solution of " chloride of manganese which has been previously mixed with a " quantity of carbonate of lime." Chloride of calcium is in solution, and carbonate of manganese precipitated. Another mode of making carbonate of manganese is as follows:—

Third, " the preparation of carbonate of manganese for the " purpose of producing oxide of manganese, by precipitating as " hydrated protoxide by the hydrate of lime the manganese " contained in the residual matter of chlorine manufacturers " (commonly consisting of chloride of manganese), and passing " a current of carbonic acid through or over this hydrate."

[*Printed, 4d. No Drawings.*]

A.D. 1855, June 7.—N° 1298.

FAVRE, Pierre Antoine.—"Certain improvements in em-"ploying the residue arising irom the lixiviation of crude sodas." These are, "the utilization of the sulphur wasted in the lixiviation "of crude soda (British barilla), by employing in the treatment "of these residues the muriatic acid evolved from the sulphate of "soda kilns." These residues, consisting principally of sulphuret of calcium, are suspended in water, and "chlorhydric acid gas" is passed into the liquid, or the hydrochloric acid in solution is added; in either case chloride of calcium is in solution, and sulphuretted hydrogen is evolved. The sulphuretted hydrogen evolved is passed into a solution of sulphurous acid, in preference, in a chamber in which there are a number of partitions arranged so that "the gas can only pass from one partition to another "after having traversed the depth of the liquid column, which "corresponds to the part of the immersed partition," the sulphur precipitates and is separated. Another mode of dealing with the sulphuretted hydrogen, eliminated as above, is to direct it into "the kilns for consuming the sulphur and pyrites. In the kilns "the gas is burnt, and the sulpurous acid so obtained is added to "that arising from the direct combustion of sulphur and pyrites." Or the gas may be burnt, and led "directly into the leaden "chamber."

[Printed, 4*d*. No Drawings.]

A.D. 1855, June 12.—N° 1339.

COULSON, Samuel.—(*Letters Patent void for want of Final Specification.*)—"An improvement in the preparation of sulphate "of baryta, and in the manufacture of glass when sulphate of "baryta is used." This consists, first, in reducing the "sulphate "of baryta by heat into the state of powder or very small "crystals," in place of "by simple grinding as heretofore." The powder "so reduced by heat may be separated into different "degrees of fineness by sieves," and may be further reduced by grinding at "much less cost than when grinding the mineral in "its raw state."

Second, "applying sulphate of baryta reduced to powder or "*very fine crystals* by heat in the manufacture of glass."

[Printed, 4d. No Drawings.]

A.D. 1855, June 13.—N° 1356.

LODGE, Edwin, and MARSHALL, George.—(*Provisional protection only.*)—" Certain improvements in the production of " animal and vegetable naptha, ammonia, and charcoal, and also " for the evolution of the carburetted and olefiant gases there- " from." These are, distilling " the refuse or waste of wool and " cotton, otherwise almost useless." The tar first distilled is redistilled, and the product may, if required fine, be treated with black oxide of manganese and sulphuric acid, and redistilled. " The ammonia of the water evolved during the first distillation " may then be combined with sulphuric, muriatic, or other acids, " and by the ordinary process of crystallization a sulphate, " muriate, or other salts of ammonia may be formed; or it may " be made into concentrated liquor of ammonia by being intro- " duced in another still, and then brought over in the ordinary " manner."

[Printed, 4*d.* No Drawings.]

A.D. 1855, July 14.—N° 1588.

ATKINSON, Edwin Senior.—" Apparatus for condensing or " absorbing muriatic acid gas from the furnaces or kilns used in " the manufacture of sulphate of soda." The muriatic acid gas, as it passes along the flues from the furnaces or kilns used in the manufacture of sulphate of soda, is inducted by an exhausting fan into a cistern, and in its passage through the water becomes condensed thereby, the process of condensation being assisted by a perforated false bottom, fixed " at a distance of about 18 inches " at one end 21 at the other from the bottom of said cistern." A pipe from the upper part of the cistern above the water level leads into the chimney shaft containing coke, which is kept cool and moist by the continual dropping of water from a cistern placed above. " When it is desired to have the draught in the " furnace or kiln greater than could be produced in the apparatus " described, the pipe from the exhausting fan is led directly into the chimney shaft, and the muriatic acid gas condensed therein.

[Printed, 8*d.* Drawing.]

A.D. 1855, July 18.—N° 1616.

ELLIS, John.—" Certain improvements in the process of manu- " facturing ammonia, charcoal, animal, and vegetable naptha."

hese are, distilling " all kinds of animal oil mixed with animal " refuse; all kinds of animal fats mixed with animal refuse; " all kinds of animal oil, oils from fish mixed with animal " refuse; all kinds of cotton and wool refuse, waste cloth, " &c., containing oil; all kinds of refuse from tallow chandlers " and butchers; all kinds of horns, hoofs, bones, and such " like substances; all kinds of materials which contain or " are impregnated with any greasy or oleaginous matters or " substances." This is effected in an arrangement of three retorts with condensers, or of four retorts with condensers. The ammonia water is placed in an " ordinary still set in brickwork " with a worm," and distilled " in the usual way, each distillation " producing a purer and more powerful article; or, instead of the " above apparatus," four closed vessels are arranged in juxtaposition, and connected " all together by bent pipes fixed to the tops " thereof. The first of these closed vessels is furnished with a " hopper-shaped mouth for charging the vessels with ammonia, " the escape of which is prevented by placing a valve " within the mouth. Steam is conducted into worms arranged within these vessels " near the bottoms thereof," the worms being connected together, " the steam escaping from the open end of the last " worm." " Each vessel is also furnished with a cock for drawing " off the ammonia in a more or less purified state, as required."

[Printed, 10*d*. Drawing.]

A.D. 1855, July 18.—N° 1620.

BELLFORD, AUGUSTE EDOUARD LORADOUX.—(*A communication from Frederic Kuhlmann.*)—" A new or improved method of " condensing vapours and smoke." These are, first, " condensing " certain parts of muriatic, sulphuric, or nitric acid, which were " often lost in manufacturing sulphate of soda and sulphuric acid, " by making use of the said acids for manufacturing baryta and " barytic salts." Employing in condensers into which the gases from the above manufactures are made to pass, in preference, " pure carbonate of baryta or a solution of muriate of baryta, or " still rather, nitrate of baryta." Sulphate of baryta is obtained and nitrate, from which caustic baryta is made, by calcining; " the hyponitric and oxygen evolved fly back again into the lead " chambers."

Second, " condensing ammoniacal vapours in manufactures of

" animal black, and washing coal smokes for producing ammo- " niacal salts and smoke blacks or manure." Causing the gases to " pass in very thin dash through a small film of water by " means of a lift and force pump," or, in preference, subsitituting " brick ducts at the bottom of which are agitators, consisting of a " shaft armed all over with brushes or bundles of horse hair, whale- " bones, or any suitable material." Agitators raise a small quantity of the condensing liquid, " either weak sulphuric or muriatic acid, " or rather muriate of manganese," " a residue often pernicious " in our chemical works," and " cause the ammoniacal vapours " to pass through a regular condensing shower." From this results " sulphate or muriate of ammonia, and carbonaceous " residues, pure or mixed with oxyd and sulphuret of manganese."

Third, extending this system " to the hot air that escapes from " furnaces in which are treated lead ashes, cobalt mine, and like " products, from which escape unwholesome emanations, and the " expense of which operation will be partly, if not wholly, com- " pensated by the condensed matters obtained."

[Printed, 4*d*. No Drawings.]

A.D. 1855, July 28.—N° 1715.

PARIS, Charles Emile.—" A new material to be used in the " manufacture of crystal, enamel, and other similar products." This is said to consist " in the employment of sulphate of lead as " a substitute in whole or in part for minium entering into the " composition of all silicates having lead as a base, for the manu- " facture of glass and other vitreous products." " In using sul- " phates of lead, the charcoal requisite for the decomposition of " the acid should not exert its influence on the oxide (preserved " besides by its combination with the silica), because the lead re- " duced would remain partly divided in the glass. An excess of " charcoal is therefore to be avoided; but on the other hand, as it " is burnt during the reaction, it is requisite to introduce into the " mixture a rather greater proportion of charcoal than the equi- " valent of oxygen of the acid of the sulphate." In operating, mixing " together about 100 parts of sand, 90 parts of sulphate of " lead, and 6 parts of charcoal," and placing it in the oven to make the frit. " When the frit is satisfactorily obtained, it is " lifted up and turned over by means of a wooden shovel, and " when found to be uniform throughout it is removed from the

" fire, then pulverized." In place of charcoal it is " possible to " employ any other substance capable of disoxigenating the sulphuric acid, so as to transform it into sulphurous acid gas."

[Printed, 4*d*. No Drawings.]

A.D. 1855, August 3.—N° 1762.

TILGHMAN, Richard Albert.—" Improvements in the manu-" facture of alkalies and alkaline earths." These are, exposing the sulphates of the alkaline earths at " a high heat alternately to the " action of deoxydizing and oxydizing agents, whereby the sulphuric " acid is gradually driven off and the alkaline bases are left in a " free state." In preference, finishing " the operation by a pro-" longed oxidation so as to destroy any sulphurets which might " otherwise contaminate the product." "The gaseous compounds " of sulphur given off by this operation may be employed, if " desired, to make sulphuric acid or sulphates by known pro-" cesses." Manufacturing "the alkalies, potash, and soda by " digesting the baryta or strontia produced by the above process " with a solution of sulphate of potash or of soda." The sulphate of baryta or strontia is ground to a fine powder, mixed with magnesia, made into bricks, and heated to a bright red or yellow, when fresh fuel is thrown in and the dampers partially closed; the sulphurous vapours escape for a time, when they cease to come off in any quantity " the kiln is made oxidizing by the admission of " fresh air," another discharge of sulphurous vapour takes place and " on its gradual decline a deoxidation is again effected as at " first;" and this is repeated until " the whole of the sulphate is " decomposed."

[Printed, 4*d*. No Drawings.]

A.D. 1855, August 7.—N° 1786.

MANNING, James Alexander.—" Improvements in the treat-" ment of sewerage." These are said to be " the application and " use of alum slate, alum shale, alum schist, alum stone, alum " ore, and other aluminous minerals and earths, as a precipitating " and clarifying agent for cleansing sewerage matters." "The " alum shale or aluminous mineral, under whatever form it may " be used, is available under various forms of treatment." One *mode of treatment* is as follows "the alum shale or slate is " *exposed for* a sufficient length of time to the action of the

" atmosphere, and is then calcined in ridges." After calcining and cooling it is lixiviated with water, to dissolve out the sulphate of alumina, &c.; the liquid, after standing eight or ten hours, is drawn off into evaporating pans and concentrated for use. " According to another mode of treatment the aluminous mineral " or earth, after being burnt or calcined, may be subjected to the " action of dilute sulphuric acid, the fluid or semi-fluid dross thus " arising from the mass of aluminous matter being employed as " the precipitating and clarifying agent." The alum sludge or aluminous matter may be obtained by various modes of treatment, either in a moist or dry state fit for use. " It may be found " expedient to employ some of the modes lately introduced for " facilitating the ustulation or calcination of the aluminous raw " material, or it may be found advantageous to continue the " boiling down of the alum liquor until the aluminous matter " reaches a dry state. Or, again, the boiling down may in some " cases be dispensed with."

[Printed, 4*d*. No Drawings.]

A.D. 1855, August 11.—N° 1825.

GARDNER, JAMES.—" Improvements in the manufacture of " salt." These are, constructing and arranging " evaporating " pans used in the manufacture of salt, for promoting evaporative " effect by utilising the escaping vapour of the heated pans." " Over an evaporating pan of the usual constructien set in a " brickwork furance," " one, two, three, or more pans " with flat or nearly flat bottoms are raised, of which " the sides project or " dip downwards;" these pans are placed one above the other, and " separated from each other to any desired distance, and so " placed that the steam rising from the surface of the liquid " in the lowermost pan shall ascend to the under part of the " next pan above it." Also providing " steam pipes, variously " placed, to carry off the surplus steam from the under side of " each pan above the lowermost pan in succession, throughout " any series of pans thus arranged." Likewise employing " ribs " of metal and other suitable means to carry off the condensed " steam from below each pan," so as to " prevent its falling into " the pan next below it;" " sometimes " forming " a steam chamber under each pan bottom with perforated or other sheet metal " bars or wires to assist in keeping up the temperature of the " steam."

[Printed, 6d. Drawing.]

A.D. 1855, August 22.—Nº 1897.

DE BUSSAC, Dupont.—"The combination of hydriodic acid, "watery or oily, or salts of iodine, with tannic acid, the constituting parts of cinchona, or of sarsaparilla, or of the leaves of the "walnut tree, and iron, or with one or several of these bodies." These are as follows:—First, distilled water, tannic acid, and an equivalent or a multiple equivalent of iodine, are heated together, until the iodine be transformed into hydriodic acid;" "instead of the iodine, hydriodic acid may be used." The raw alkaloids of cinchona, or their salts, are dissolved similarly in hydriodic acid. On mixing these two liquids, "there is formed "a double hydriodate of tannin and cinchona quinine alkaloids." Iodide of iron is dissolved and mixed with the above solution of tannic acid; this solution assumes a green colour, which is "got "rid of by mixing a little loaf sugar with the liquid;" or "syrup "of iodide of iron."

Second. "The extract, more or less concentrated, of cinchona," may be treated as above.

Third. "The powder of cinchona is treated by the method of "displacement, by means of the hydriodic acid liquid." On analysing the result, if either iodine, alkaloids, or tannin be wanting, they are to be added. Iron may be added as above.

Fourth. "Powder of cinchona, distilled water, and liquid hydriodic acid," by boiling, forms "hydriodate of cinchona." "Sarsaparilla and walnut leaves" are treated in this way, or by "the process of displacement.

Fifth. Oil is substituted for water in the above processes. "Fatty hydriodates are thus formed."

[Printed, 4*d*. No Drawings.]

A.D. 1855, August 23.—Nº 1909.

MARTIEN, Joseph Gilbert.—"Improvements in preparing "certain oxydes of iron for use and for apparatus to be used "therein." These are, subjecting "cinders from furnaces employed in puddling, refining, heating, and welding iron; also "the cinders from the processes of squeezing, rolling, and hammering iron; also the cinders produced in the manufacture of iron "by the Catalan furnace, or in furnaces for making wrought iron "direct from the ore, as the Renton furnace," to the following *purifying process*:—"A charge of cinder or oxides is to be heated "*and fused in a* suitable apparatus," preferring a furnace of the reverberatory kind with a lower and an upper bed in order to prepare the oxides or cinders before raking them on to the lower bed to be fused and purified. The upper bed is from time to time supplied with crude cinders or oxides through a hopper. The heat and products from the fire and from the oxides or cinders pass off to the chimney. Atmospheric air or steam is to be introduced through tubes or openings below the mass of cinders or oxides in any convenient manner; or in place of air or steam smaller streams of water may be forced into and amongst the melted mass. "This process requires about thirty minutes," after which it is discharged through a tap hole. The resulting product will be per oxide of iron, and generally in a porous and spongy state. "In place of allowing the fluid mass, after it has been run " off from the furnace, to cool as a mass, it may be run into a " receptacle, and have streams of water or steam passed through " and amongst it, which will aid in granulating the matters and " keeping them porous."

[Printed, 10*d.* Drawing.]

A.D. 1855, August 30.—N° 1963.

GOSSAGE, WILLIAM.—" Improvements in the manufacture of " carbonates of ammonia, and in the useful application of such " carbonates." These are, first, " the manufacture or production " of single carbonate of ammonia in aqueous solution from " ammoniacal gas and carbonic acid gas, by the employment" of an apparatus "designated an absorbing tower." In preference the temperature of the first absorbing tower is about 100° F., and " of the second absorbing tower at about 130°." This regulation of temperature is effected " by the use of warm lipuids for con" densation or by other means." Regulating " the proportionate " quantity of ammoniacal gas and of carbonic acid gas supplied " to such first absorbing tower, so that the compound obtained " by the union of such gases may be chiefly if not entirely single " carbonate of ammonia."

Second. " The manufacture or production of bicarbonate of " ammonia by distillation from aqueous solutions of sesqui" carbonate or of bicarbonate of ammonia, and the simultaneous " production of single carbonate of ammonia." The solution of these salts prepared as described in No. 422, 1854, is distilled while *agitated by steam* or otherwise at from 100° to 130° F., until the solution remaining is chiefly single carbonate of ammonia. The distillate condensed in cold water is "bicarbonate of ammonia." The solution of single carbonate of ammonia may be used as it is, or is converted into a higher carbonate by passing it through an absorbing tower with carbonic acid gas.

Third. "The useful application of carbonates of ammonia" prepared as above or as described in No. 422, 1854, "for the "precipitation" of the carbonates of lead, manganese, or zinc, "from suitable salts of each of such metals." In preference chloride of lead is decomposed by a solution of single carbonate of ammonia, or in preference by means of a solution of one equivalent of caustic ammonia, and then "of single carbonate of "ammonia;" the precipitate consists "of one proportion of "hydrated oxide of lead, and three proportions of carbonate of "lead, being analogous in its composition to the ordinary white "lead of commerce." The precipitate is washed, dried, &c., and the liquids distilled with lime, and the ammoniacal gas employed in the reproduction of carbonate. Chloride of manganese solution is treated with carbonate of ammonia until the whole or nearly the whole of the iron is precipitated; the solution is separated, and carbonate of ammonia is added to it until all the manganese is precipitated. The precipitate of carbonate of manganese is washed, dried, and may be used, or is converted into "binoxide "of manganese, to be used for the manufacture of chlorine" by heating it with access of air at 500° F. The solutions from the carbonate are employed as above. Solutions of the salts of zinc are treated as above, and the carbonate of zinc washed, and the liquids treated as above.

Fourth. "The useful application of bicarbonate of ammonia "(obtained by distillation from aqueous solutions of sesqui-"carbonate or of bicarbonate of ammonia) for the decomposition "of common salt, and production of bicarbonate of soda and sal-"ammoniac by such decomposition." Either employing the condensed product from distilling solutions of sesqui-carbonate or bicarbonate of ammonia, or passing their vapours "at once into "a closed vessel containing common salt and water."

[Printed, 4*d*. No Drawings.

A.D. 1855, September 4.—N° 2002.

DE LA RUE, WARREN.—"Improvements in treating Burmese "naptha when obtaining products therefrom." These are, subjecting Burmese naptha to the action of free steam, at a temperature of about 212° of F., to drive off the more volatile constituents, and so as to produce a residue of sufficient consistence to be used alone or combined with other matters for lubricating machinery. "This product or residue is purified by "means of dilute acid, muriatic acid preferred, and alkali. The "acid combines with substances of an alkali nature and produces "valuable products," from which the alkaloids can be separated by "stronger bases, as potash, soda, lime, or baryta."

[Printed, 4*d*. No Drawings.]

A.D. 1855, September 12.—N° 2060.

HIGGIN, James.—"Improvements in treating madder or preparations of madder, so as to obtain a coloring substance there- "from." These are, in reference to this subject, "the condensa- "tion of ammonia after acting on madder or preparation of "madder, or any plants of same family," as follows:—Connecting "the pipe passing through the cover of the cylinder with a "close vessel of any convenient shape," "into which is caused "to be passed at the same time through another pipe muriatic "acid or acetic acid," which will combine with the ammonia, or the ammonia may be caused to pass into an acid solution;" or, "in case of steam and ammonia being used," passing "the mix- "ture on issuing from the cylinder into a worm or suitable "refrigerator surrounded by cold water, when liquid ammonia "will be recovered."

[Printed, 4*d*. No Drawings.]

A.D. 1855, September 12.—N° 2063.

SPILSBURY, Francis Gybbon, and EMERSON, Frederick William.—"Improvements in the manufacture of paints or "pigments." These are said to be, first, "the use of the tung- "states of zinc, calcium (lime), antimony, aluminium, magne- "sium, barium, or strontium, as paints or pigments." In combining tungstic acid so as to form any of these compounds, any soluble salt of zinc, calcium, &c., &c. is dissolved, and a solution of tungstate of soda or other soluble tungstate is added to it in equivalent proportions, and the precipitated tungstate is collected, washed, &c.

Second. " Any combination or mixture of two or more of the " aforesaid tungstates."

Third. Disclaiming " the simple combination of tungstate of " lead, that having been already secured by a previous patent," claiming all mixtures or combinations of the above-mentioned tungstates with oxide of lead in whatever manner produced. " To " effect this combination mixing with an equivalent of either of " the solutions of the salts of the foregoing oxides a solution of a " similar salt of lead in the proportion of their respective equivalents." To this compound solution adding a solution of a double equivalent of tungsate of soda, and the resulting precipitate is washed, dried, &c.

Fourth. " All mixtures of the aforesaid tungstates, whether with " or without oxide of lead, with the antimonites, antimoniates, " arsenites, or arseniates of any of the aforesaid bases when " applied to the manufacture of paints or pigments." As an example, to combine tungstic acid with oxide of strontium, oxide of lead, and arsenious acid, dissolving " 106 parts of anhydrous " nitrate of strontium in 166 parts of nitrate of lead in water," and into this solution pouring " 148 parts of anhydrous tungstate " of soda and 162 parts of crystallized arseniate of soda," the precipitate is washed and dried.

[Printed, 4*d*. No Drawings.]

A.D. 1855, September 20.—N° 2118.

DEACON, HENRY.—(*Provisional protection only.*)—" Improve" ments in the manufacture of solutions of carbonate of ammonia " and in the manufacture of caustic ammonia." These are, first, " exposing ammonia in solution, and not in the gaseous state, to " the action of carbonic acid," by causing the solution to pass " down vessels containing coke, bricks, or some inert materials " while " carbonic acid gas procured from any convenient source, " and either under pressure or not, is passed up such vessels." " The gases not absorbed are passed through condensers before " being allowed finally to escape, to avoid a loss of ammonia by " volatilization."

Second. " Attaching to a continuously acting ammonia still a " vessel filled with quicklime, and provided with suitable means " of forcing the lime continuously into the ammonia still."

[Printed, 4*d*. No Drawings.]

A.D. 1855, September 21.—N° 2122.

DALE, John.—"Certain improvements in appropriating waste "products arising in the manufacture of certain chemical com-"pounds." These are, first, "in the manufacture of arsenic acid "from arsenious acid by acting upon it with nitric acid; the "nitrous gases evolved are conducted into protochloride, proto-"sulphate, or other protosalts of tin," by which they are "con-"verted into salts of the higher oxide of tin;" and in the Final Specification, although not in the Provisional Specification, it is stated that the evolved gas or gases are used "for the oxidation "of protosalts of iron," or they are conducted "into a solution "of an alkali or their carbonates, producing a salt known as "nitrite of the alkali which it may have been conducted into."

Second. Making "picric acid by the action of nitric acid on "organic products;" also "oxalic acid" by the action of the same acid "on sugar or starch," and conducting "the gases "evolved into protosalts of tin to peroxidize the same as before."

Third. Making "salts of iron or copper by the action of nitric "acid on iron or copper," and conducting "the evolved gases "into protosalts of tin to peroxidize the same."

"The persalts of tin thus obtained are used as persalts, "or are decomposed by alkalies or their carbonates, and the "resulting oxide combined with soda or potash to form stannate "of soda or potash," also "combining arsenic acid, if required, "with soda or potash, so as to produce arseniate of soda or "potash."

[Printed, 4*d*. No Drawings.]

A.D. 1855, October 2.—N° 2202.

STOTT, George Louis.—(*Provisional protection only.*)—"Im-"provements in the manufacture of carbonate of soda." These are, in converting the "alkaline liquor, known amongst alkali "manufacturers under the name of vat liquor or solution of sul-"phuret of soda," by "forcing or pumping, or otherwise com-"pelling under pressure, the carbonic acid gas to enter into the "alkaline sulphuretted solution contained in a close vessel, "whereby the gas is economized and brought in a much shorter "time into intimate contact with the soda in the alkaline solu-"tion whilst the sulphur in the same is displaced or precipitated;" there are pipes for "letting off the carbonized liquor and the sul-

" phur and impurities, with cocks for closing the same. This " vessel may also contain a central shaft furnished with arms for " keeping the liquor in agitation, being connected on the outside " with suitable gearing, and connected with power for keeping " the same in motion." After this treatment the liquor may at once, " after being filtered, be evaporated down to the proper " strength and set aside in vessels to form crystals of soda, or " may be evaporated down into the alkaline salt known as soda " ash; or after being deprived of its carbonic acid by the usual " means, may be applied and used at once in the liquid state in " the manufacture of soap."

[Printed, 4*d*. No Drawings.]

A.D. 1855, October 4.—Nº 2220.

MELDRUM, EDWARD, and YOUNG, JAMES.—" Improvements " in the manufacture of certain salts of sodium and potassium." These are, " manufacturing the cyanides of sodium and of potassium by employing the metals sodium and potassium in place " of employing the oxides or salts of those metals as heretofore " practised." The metals are prepared as hitherto practised. When " cyanide of sodium is to be manufactured, for every fifty " parts by weight of such metal," " one hundred parts of charcoal " in a state of division are added, and the whole introduced into " the retort and the mixture is to be kept well stirred, and when " it has arrived at a bright red heat ammonia or nitrogen of the " air is introduced, or horn or matters capable of affording the " requisite nitrogen are slowly added the stirring being continued, " and when a quantity of such nitrogenous materials have been " introduced as will afford at least fifty parts by weight of nitrogen, and when no more ammonia or nitrogen is taken up by " the mixture (and this will be readily ascertained by testing the " gases coming off), the process will be complete, and the prussiate " is then to be made in the same manner as it is usually prepared " from cyanide of sodium by the old process."

If cyanide of potassium is to be manufactured, for every fifty parts by weight of that metal, seventy parts by weight of powdered charcoal are added, and the process continued and finished as above.

" When it is desired to form a double salt containing both " sodium and potassium, then both the metals are introduced into " the retort, and the process is carried on as above explained."

[Printed, 4*d*. No Drawings.]

A.D. 1855, October 11.—N° 2275.

SPENCE, Peter.—" Improvements in the production of sul-" phate of alumina, to be used in the fluid state, or to be rendered " into the solid condition, known commercially as cake alum." These are, first, "the use of the materials," decomposing granite or rock, "sometimes called China clay," "found in great abun-" dance in various parts of Cornwall, and may exist in other " localities," for the above purpose.

Second. "Treating the materials in preference" as follows, for the purpose of extracting iron. "The decomposed granite or " rock is broken into pieces the size of small beans, placed in a " vessel, and covered with a fluid consisting of water impregnated " by any well known means with sulphurous acid gas so as to " contain double its volume," adding "to such water one per " cent. of sulphuric acid of commerce," and the whole allowed to remain for about twenty-four hours, by which time "it will have " dissolved a considerable portion of the iron." The liquid is run off, the material is washed with water, and boiled with sulphuric acid of a certain strength until saturated with alumina, and the solution of sulphate may be used as such or proceeded with for cake. In the Provisional Specification, to get rid of the iron " the material in fragments is first calcined, and then placed in a " suitable vessel to which muriatic acid is added; this removes " the iron that may be present; after which it is treated with " sulphuric acid."

[Printed, 4*d*. No Drawings.]

A.D. 1855, October 13.—N° 2290.

THIBIERGE, Germain Adolphe.—" Improvements in manu-" facturing chlorine, part of which are applicable for obtaining " certain accessory products." These are, the production of hydrogen, chlorine, and peroxide of iron by the following process: —Muriatic acid gas, artificially dried, is caused to pass over iron at a high temperature, contained in a suitable vessel capable of resisting the simultaneous action of the gas and a red heat. The resulting products are " protochloride of iron and hydrogen gas." The hydrogen may be passed on to the gasometer. The proto-chloride of iron is *then exposed* in the same vessel to the action *of a current of dried* atmospheric air, the effect of which is to decompose the chloride of iron, and to produce peroxide of iron and chlorine. The chlorine so obtained may be employed for bleaching and other purposes.

[Printed, 4*d*. No Drawings.]

A.D. 1855, October 13.—N° 2297.

LOZANO, MANUEL PEREZ.—(*A communication.*)—"Improve-"ments in treating pyrites and ores containing sulphur in obtain-"ing sulphuretted hydrogen, and in precipitating copper from "solutions." These consist, first, in a furnace for the purpose of distilling sulphur from pyrites or ore containing sulphur. The pyrites being broken into small pieces are placed in a furnace so constructed that a stream of mixed hot smoke, vapours, and gases, proceeding from another furnace, "called the gas generator," shall enter the pyrites furnace at the roof, and percolating down through the pyrites escape at the bottom, carrying with it the sulphur in a gaseous state to the condensing chambers.

Second. The production of sulphuretted hydrogen gas from pyrites, and consists in passing heated inflammable gases, such as hydrogen or carburetted hydrogen gas, arising from the combustion of coal, peat, and wood, "through pyrites contained in a similar "apparatus to that already referred to; or sulphuretted hydrogen "may be obtained by passing the gas obtained by the destructive "distillation in a retort of coal, oil, &c., through other heated "retorts containing such porous substances as calcined pyrites, "coke, &c., into which is introduced a sufficient supply of melted "sulphur; or, lastly, sulphuretted hydrogen may be obtained in a "pure state by heating together sulphur with such substances" "as" tar, pitch, resin, stearine, oils, or other fatty animal "or "vegetable matters" in a cast-iron retort. The heat should be applied slowly, and gradually raised to the evaporating temperature of sulphur.

Third. The application of sulphuretted hydrogen for the extraction of copper from copper ores. The ore containing copper in the state of "sulphide" is calcined in the usual manner; the resulting sulphate of copper is washed out, and exposed to the action of sulphuretted hydrogen in air-tight chambers, the action of which is to separate the copper from the iron. The precipitated sulphuret of copper is then "washed, pressed, dried, and smelted "into rich regulus, which may be worked for fine copper by any "one of the well-known methods."

[Printed, 1*s*. Drawings.]

A.D. 1855, October 18.—N° 2335.

GLASS, William.—"Improvements in obtaining a deodorizing " and disinfecting material." These are said to be "the use of " acetate of zinc alone or in combination with sulphate of zinc, " whether they are kept separate previous to use or combined " together in a powder or solution, as a sulpho-acetate for the " purposes of disinfection and deodorization." In preference, using "the acetate alone where expense is not an object; & for " obtaining the most economical results from the sulpho-acetate" mixing 85 parts by weight of the sulphate with 15 parts by weight of the acetate; "but these proportions may be varied in some cases " with advantage."

[Printed, 4*d*. No Drawings.]

A.D. 1855, October 23.—N° 2371.

RICHARDSON, Thomas.—" Improvements in the manufacture " of glass and clay wares." These are said to be the application " of native borate of lime alone, or fritted with a salt of soda, in " the preparation of glaze for clay wares; " also the application " of native borate of lime alone, or fritted with a salt of soda, in " the manufacture of glass." The patentee sates "that previous " to this patent borate of lime in its natural state was" at his " suggestion publickly used in glazing certain clay wares; but " owing to the impurities present the color of the ware was more " or less injured," and which he has "since found to be obviated " by employing borate of lime purified" as follows:—The native mineral " is levigated in a manner similar to that in color works," admitting a "jet of steam into the dolly tub to promote the " purification. The sand and coarser impurities are separated in " the dolly while the finely divided borate of lime flows on " through the spouts into tanks, where it subsides, leaving the " soluble impurities in solution in the supernatant liquid, which " may be syphoned or run off. The borate of lime is dried in " dishes in stoves or in reverberatory furnaces, with a gentle " surface heat and occasional agitation by the workman. For " courser wares and inferior qualities of glass it is unnecessary to " carry the purification to such an extent. The adhering sand or " impurities may be removed by simply brushing off the sand or " impurities from the masses or exposing them to a current of " water."

[Printed, 4*d*. No Drawings.]

A.D. 1855, November 7.—N° 2505.

JOHNSON, WILLIAM.—(*A communication.*)—" Improvements " in the manufacture and application of prussiates and other " coloring matters." These improvements relate, in the first place, to the application in the manufacture of Prussian blue, prussiate of soda, prussiate of potash, and other colouring matters, of the refuse matter of the gas purifier, and of soot and other refuse matters from chemical works, foundries, glass works, and kilns, where a certain quantity of fuel is consumed. In using these substances in the said manufacture they are to be treated with alkalies, sulphate of iron, or other persalts of iron. Insoluble cyanides or ferrocyanides may be treated with a solution of caustic alkali, such, for example, as caustic soda, and if this alkali is used, prussiate of soda will be produced. The refuse animal charcoal of sugar refiners may be similarly treated with caustic alkali, so as to produce useful colouring matters. The said invention also comprehends the employment or use of soluble silicates in the manufacture of prussiates; and also the employment and use of insoluble soaps, such as the stearates or resinates of lime or magnesia, as bases for the blue coloring matter. The said invention further relates to the application and use, in the manufacture of blue balls for washing purposes, of apparatus similar to that used for making pills or lozenges.

[Printed, 4*d*. No Drawings.]

A.D. 1855, November 7.—N° 2514.

SIEMENS, CHARLES WILLIAM.—(*Provisional protection only.*) —" Improvements in evaporating brine and other liquids, and in " distillation." These are, exposing " the liquid in a covered " pan with a double bottom to the influence of a circulating " current of a permanent gas, in such a manner that the said " current passes in a zig-zag or circular manner along the surface " of the evaporating liquid, commencing at the end opposite the " source of heat and advancing towards the heated end; at certain intervals portions of the current descend into the double " bottom below the liquid, and return towards the cooler end of " the pan, passing finally through a condenser or chamber containing a series of pipes filled with the cold liquid; the current " is urged by means of a propeller or fan to pass again over the " surface of the evaporating liquid, as before described. The

" source of heat consists of one or more steam boilers and fur-" naces. The steam generated in the boilers passes first of all " either partially or wholly through an engine" (preferring "a " reaction wheel)," "in order to produce the necessary power for " working the fan, pumps, or other machinery." "The steam " next enters one or more steam chambers or system of tubes, " in contact with the evaporating fluid at the extremity of the " pan opposite the entry of the circular current, where it con-" denses in boiling the liquid, and the water of condensation is " forced back into the steam boilers. The fire after it leaves the " steam boilers passes through a system of flues made of metal " or pottery, that cover the entire length of the pan, above the " evaporating liquid, and finally reaches the chimney."

[Printed, 4*d*. No Drawings.]

A.D. 1855, November 22.—Nº 2637.

DUNLOP, Charles Tennant.—"Improvements in the manu-" facture or production of artificial oxide of manganese." These are, "producing peroxide of manganese by gentle calcination of " carbonate of manganese, prepared from chloride of manganese " by precipitation with carbonate of lime."

" Preparing carbonate of manganese from the residuum of the " chlorine manufacture by boiling it under a high or low " pressure with carbonate of lime."

" Preparing carbonate of manganese from chloride of man-" ganese by precipitation with carbonate of lime artificially " prepared," by "passing carbonic acid into hydrate of lime, or " by using a carbonate of lime prepared by precipitation of a " lime salt by an alkaline carbonate," "such as gas liquor," " the liquor being mixed with chloride of calcium, which also " produces a muriate of ammonia."

[Printed, 4*d*. No Drawing.]

A.D. 1855, November 26.—Nº 2655.

MARGUERITTE, Louis Joseph Frédéric.—"Improvements " in precipitating certain salts." These are, first, "the precipi-" tation by chlorhydric acid of marine salt in a pure white divided " state," whether "the acid from soda works," or the acid from what is "termed reciprocal apparatus" be employed. "The " *reciprocal apparatus*" consists of two vessels connected together; in one is hydrochloric acid and chloride of sodium, in the other is the solution of common salt. On heating the former, "it lets off its acid, while the other absorbs it," and "the salt "settles in one, and is dissolved in the other."

Second. "The precipitation by chlorhydric acid of the chlorides "of sodium and of potassium" from a solution "of sulphate "of soda or of potash of any source;" sulphuric acid is set free and is distilled off, and chloride of sodium is precipitated from the solution of the "double chloride of potassium and "of magnesium."

Third. "The purification or washing by chlorhydric acid of the "chlorides of potassium and of sodium."

Fourth. "The use of chlorhydric acid diluted for dissolving in "the warm state marine salt, and precipitating it atom-like in "the cold state, by merely stirring or agitating the liquid."

Fifth. "The precipitation of carbonate of soda" from its solutions "by ammoniacal gas, and the purifying of raw soda by "washing it" with a solution saturated with ammonia.

[Printed, 8*d*. Drawing.]

A.D. 1855, November 27.—N° 2675.

STOTT, George Louis.—"Improvements in the manufacture "of carbonate of soda." These are said to be "the use or employ"ment of" the oxides of iron, manganese, and zinc, "for the "purpose of freeing vat liquor or solution containing sulphuret "of sodium from the sulphur held in solution or combination "therein." These oxides in powder are added with agitation, the sulphuret of the metals are separated, and the solutions carbonated by carbonic acid, or not, are evaporated. The sulphurets of the metals are collected, and the sulphur expelled "by roasting "in a current of air, or by other means." "The oxide of the "metal may be used in the state of carbonate of the oxide," and "in this case a smaller quantity of carbonic acid gas will after"wards be necessary to complete the conversion of the soda into "carbonate of soda." In the Provisional Specification it is stated that the vat liqour is freed "from the sulphur held in "combination therein," "chiefly by placing such liquor in a suit"able covered or closed vessel, and forcing, pumping, or other"*wise compelling* carbonic acid gas to enter and combine with "*the said liquor* under pressure," the alkali being "converted

" into carbonate of soda," but nothing is said about this in the Final Specification.

[Printed, 4*d*. No Drawings.]

A.D. 1855, December 5.—N° 2736.

BEATSON, William.—" Improvements in treating borates of " lime and magnesia, and a new composition formed therewith, " suitable for glazing and other purposes for which borax has " been or may be employed." These are, first, " heating or " fluxing the borates of lime and magnesia along with carbonate " of soda (either dry or in crystals), or with sulphate, muriate, or " other salt of soda in a furnace, and heating the fused mixture " to a red heat, whereby the combination of the soda and boracic " acid is more completely effected; the resulting borax or borate " of soda is dissolved and crystallized in the usual way."

Second. " Treating by boiling or otherwise the mineral borate " of lime and magnesia with ammonia, or potash, or the carbonate, sulphate, or other salts of the said alkalies (preferring the " salts of ammonia), and which combine with the boracic acid of " the mineral in the humid method more completely than the " salts of soda do."

Third. " Treating the borates of lime and magnesia, by boiling " or otherwise, with sulphate or muriate of soda, either alone " or in preference along " with a small proportion of ammonia, or of " the sulphate or other salt of ammonia."

The proportions in which the substances are used in the above operations are given.

Fourth. " Combining borates of lime and magnesia directly, " that is to say, without preliminary decomposition, with dry " carbonate of soda, or with potash, silica, alumina, oxide of lead, " or other alkaline or earthy ingredient," to form a composition suitable for glazing, &c.

[Printed, 4*d*. No Drawings.]

A.D. 1855, December 6.—N° 2746.

BARROW, John, junior.—(*Provisional protection only.*)—" An " improved process of manufacturing soda and sulphuric acid." This consists in " the use of manganese or any of its several " oxides as a substitute for lime, in the ordinary decomposition " of sulphate of soda in the black-ash furnace." Also " the use

" of the sulphuret of manganese so obtained for the production of " sulphurous and sulphuric acid." After roasting the sulphuret of manganese, it is stated that the oxide remaining "may be " available for the production of chlorine, or for further use in the " black-ash furnace."

[Printed, 4*d*. No Drawings.]

A.D. 1855, December 31.—N° 2957.

STEVENSON, James Cochran, and WILLIAMSON, John. —" Improvements in the manufacture of soda and alkali." These are, " the heating of the chalk and coal, and reserving the intro- " duction of the sulphate of soda until the materials for its " decomposition have attained a high temperature." The advantages are said to be, " that a smaller portion of sulphate of soda " is carried away by the draught of the furnace, and less soda " volatilized by the heat and oxydation;" " less tendency to form " cyanide of sodium and other objectionable impurities, and the " ball soda or black ash resulting is more easily soluble in water."

[Printed, 4*d*. No Drawings.]

1856.

A.D. 1856, January 29.—N° 234.

DARLINGTON, George.—(*Provisional protection only.*)— " Producing oxide of zinc from its ores." These are, taking " the ores of zinc, either blende (sulphide of zinc), calamine " (carbonate of zinc), or any other varieties of zinc ores whatever, " and introducing them into a blast or reverberatory furnace," mixed " with any or all of the following substances, lime, lime- " stone, tap cinder," " silica, or any siliceous matter, oxide of iron, " or iron and coke, or any other suitable carbonaceous matter." The ores thus mixed are " exposed to a sufficient degree of heat" " to ensure the production of oxide of zinc." " The furnace in " which such oxide of zinc is to be produced is to be so constructed " that it shall allow the oxide of zinc to be passed into an appa- " ratus whereby the oxide of zinc to which this invention relates " *is to be converted* into metallic zinc."

[*Printed* 4*d*. No Drawings.]

A.D. 1856, February 19.—N° 412.

GERBAUT, HENRI.—(*Provisional protection only.*)—"Improve-" ments in the manufacture of vinegar." These are, charcoal, freed of its soluble and alkaline substances, is put into a wooden tub in a dark place of a certain constant temperature, "and " exposed to the action of the air," is properly rendered acetous by pouring in it several times pure vinegar in different proportions. A mixture of rain water and pure alcohol in certain proportions " is then filtered at certain intervals through the acetous charcoal, " after which the above process of rendering the charcoal acetous " is to be repeated."

[Printed, 4*d*. No Drawings.]

A.D. 1856, February 20.—N° 424.

LAMING, RICHARD.—"Improvements in purifying gas in pre-" paring materials useful for purifying gas, and in apparatus to be " used in purifying gas and disinfecting gas liquors or washings." These are, in reference to this subject "the manufacture of mate-" rials useful for purifying gas by peroxidizing either at a low red " heat, or any lower and adequate temperature, a lower oxide of " iron artificially distributed either by itself or in combination " with an acid in earthy matter, or in a mixture of earthy matters " capable of neutralizing the acid if any be combined with the " iron, the said material not containing any porous substance of a " combustible nature."

Sometimes to render the materials "less liable to become clogged " up by moisture or by sulphur deposited in them by the gas " they are mixed with small fragments of bricks or other forms of " anhydrous alumina, or with other substances of an incombustible " nature." These materials are capable of being revivified an indefinite number of times without removal from the purifying vessels and without the danger of overheating. When by long continued use they become clogged with solid sulphur, "the " sulphur may be burned off from them even to profitable account " in making of oil of vitriol (owing to the absence of sawdust and " all other forms of combustible carbon), and the peroxide materials " thereby recovered for the purification of gas in the same manner " and quite as effectively as at first."

The purifying materials are spread on the sieves of two purifying vessels so fitted with valves as to be used separately and alternately, when the first is saturated with impurities, the gas is passed on to the second and air is passed through the first, by which the sulphur is deposited, and the ammonia and carbonic acid is evolved into a vessel containing sulphuric acid, sulphate of ammonia is formed, and carbonic gas is set free into the atmosphere.

The other improvements refer to the other matters contained in the title.

[Printed, 6*d*. No Drawings.]

A.D. 1856, February 21.—Nº 440.

MOLL, Isaac.—"The treatment of sulphate of alumina of "commerce, and its formation of compounds useful for the "disinfecting of organic substances in a state of putrifaction, as "well as for other purposes." The object of the treatment "is to "form a solid body capable of being reduced to a powder which "can resist the action of humidity and of the atmosphere, at the "same time preserving for the greatest part a facility of dissolu-"tion which can be easily used either in a solid or liquid state, as "the case may be." The first method is to evaporate the solutions of sulphate of alum, "so that when cool they may become "solid masses, which may be melted into any form that may be "judged convenient." "When these sulphates contain too "much sulphate of iron, that can be got rid of first by the pro-"cess of crystallization, if it be thought advisable."

Second. "Adding to the sulphate of alumina alkalies, either "base or salt, separately or mixed with several others." The object in doing this "is to envelope the sulphate of alumina either "in a crystalline, gelatinous, or any other texture, so that the "damp has little or no power over it." In some instances ammonia, potash, and soda alums are the result. When alkaline earths or salts of the alkaline earths are mixed with the sulphate of alumina, the precipitated salt of the alkaline earth, say "sulphate "of lime, of magnesia, or baryte, &c." when "mixed with the "alum separated from its acid, constitutes an enduit, more or less "gelatinous, which will also resist the action of humidity after "it has been thoroughly dried."

[Printed, 4d. No Drawings.]

A.D. 1856, February 23.—N° 461.

GEDGE, John.—(*A communication from C. Rostaing.*)—(*Provisional protection only.*) — "Improvements in preparing and "combining metallic substances for producing colours, and in "manufacturing the same." This process is based on the properties "possessed by 'blende' or native sulphuret of zinc, of transforming into oxide more or less pure, and in its amorpheous state "of discharging all its sulphur when submitted to proper heat in "a reverberating furnace. The oxide then remaining is coloured "by other metallic oxides, such as oxides of iron, manganese, "cobalt, mickel, chromium of copper, uranium, or other." The blende, if containing dirt, gange, or other impurities is "cleansed, "and by the aid of a mill reduced to powder fine as flour," and placed in a vessel "and moistened with about $\frac{1}{100}$th part of its "weight of sulphurated azotic acid, or hydrochloric nitric acid in "twice its weight of water, the whole being carefully mixed; or "commercial sulphate of zinc may be advantageously substituted "for the acids in the proportion of 3 or 4 lbs. of sulpate of zinc "to 100 lbs. of crude blende, in which case the sulphate is mixed "with the blende, and they are together ground into a powder. "These mixtures are then placed in the reverberating furnace "(previously heated), and spread upon the bottom in a bed of "about two inches in thickness. The acids or the sulphate of "zinc are added for the purpose of oxidizing a part of the sulphur contained in the blende, and causes the roasting to "proceed with great celerity."

[Printed, 4*d*. No Drawings.]

A.D. 1856, February 26.—N° 485.

BARROW, John, junior.—"Improvements in the manufacture "of soda, sulphurous and sulphuric acids, carbonic acid, chlorine "and muriatic acid, and apparatus used therein." These are, first, "the manufacture of soda and the carbonate of soda by the "decomposition of sulphate of soda by means of carbon and "manganese, or any of the several oxides of manganese or the "carbonate of manganese, and by the decomposition of sulphuret "of sodium by means of carbonate of manganese." Sulphate of soda, coal, and oxide or carbonate of manganese in certain proportions are mixed together and heated in a furnace or retorts, or the sulphate of soda is decomposed by means of carbon in a furnace, &c., and treated in solution or otherwise with carbonate of manganese.

Second. "The conversion of carbonic oxide gas into carbonic acid "by means of the oxides of copper, iron or manganese, or by any "other body capable of yielding oxygen to the carbonic oxide in "heated tubes," and "its application to the conversion of soda "into carbonate or bicarbonate of soda, or for any other appli-"cation for which carbonic acid may be required." The gases from the first furnace or retort are made to pass over the oxides in heated tubes, and the carbonic acid formed is employed as above, &c.

Third. "The use of sulphuret of manganese," for "the purpose "of obtaining sulphur, sulphurous acid, sulphuric acid, sulphate "of manganese, and the residual oxide of manganese," and using and applying these several substances to any purpose to which they can be applied.

Fourth. "The decomposition of chloride of sodium or common "salt, by means of sulphate of manganese, and the use and applica-"tion of sulphate of soda and chloride of manganese so obtained." The sulphate of manganese is washed from the oxide, and the solution decomposed by an equivalent quantity of common salt, and the sulphate of soda and chloride of manganese are separated by chrystallizing out the sulphate of soda.

Fifth. "The decomposion of chloride of manganese" by "means "of a current of dry oxygen gas or atmospheric air, with the "assistance of heat into free chlorine and oxide of manganese, or "by means of a current of oxygen gas, or a current of atmos-"pheric air and vapour of water, with the assistance of heat, into "muriatic acid and oxide of manganese, and the use and appli-"cation of chlorine, muriatic acid, and oxide of manganese so "obtained" to any purpose required.

Sixth. "The arrangement of retorts so as to collect and render "useful (by conversion into carbonic acid) the carbonic oxide "formed during the decomposition of sulphate of soda." As soon as the decomposition is complete in No. 1 retort, No. 2 retort is filled with similar materials, and the gases from No. 2 retort are passed through the tubes with the heated oxides, and the carbonic acid thus formed is passed into "the already decomposed "*materials in No 1 retort.*"

[Printed, 6d. No Drawings.]

A.D. 1856, February 28.—N° 514.

DE FONBONNE, Charles Alexandre.—" Improved apparatus for the manufacture of coke and for blasting, also for the " production and extraction of illuminating and combustible gas, " as well as ammoniacal and bituminous matters, part of such " apparatus being applicable to the consumption of smoke." These refer, in the first place, to a general arrangement of apparatus for the manufacture of coke and gas, wherein the furnaces, four in number and set in pairs, are provided with suitable flues, dampers, hydraulic valves, &c.

Second. In applying an " artificial draft apparatus," " which " aspires or inducts the gaseous and other products resulting from " the distillation of the coal." This appears to be effected by an air pump.

[Printed, 2*s*. 10*d*. Drawings.]

A.D. 1856, February 28.—N° 516.

BROOMAN, Richard Archibald.—(*A communication from Pierre Gédeon Barry.*)—" Improvements in treating bituminous " shale, boghead mineral, and other like schistous bodies, in order " to obtain various commercial products therefrom." These are, by distilling and treatment with sulphuric acid and soda of the raw oil, and fractionally re-distilling the result; nine different products are obtained, among which is " ammoniacal water con- " taining six per cent. of liquid ammonia."

See also Abridgements of Specifications on oils.

[Printed, 8*d*. Drawing.]

A.D. 1856, March 6.—N° 562.

POCHIN, Henry Davis.—" Improvements in the manufacture " of aluminous and silicious compounds." These are, " treating " of a mineral containing variable proportions of silica and " alumina with powdered charcoal, peat, pitch, pitch-coke, soot, " sawdust, or other carbonaceous matter, leaving but little ash " and no iron after combustion, in a reverberatory or other fur- " nace," until " the whole of the carbonaceous matter has been " burnt away," for the manufacture of aluminous and silicious compounds. The clay, &c. is ground and mixed with certain proportions of the above substances, depending upon the nature of the *substance employed*, but these proportions may be varied and calcined as above. The result "can be employed with advan-" tage in the manufacture of aluminous cake, pure sulphate of " alumina, the alums of commerce, and other aluminous com-" pounds, whilst the silica afforded can be used for those pur-" poses for which pure silica is required."

[Printed, 4*d*. No Drawings.]

A.D. 1856, March 7.—N° 571.

HÄHNER, Guillaume.—(*A communication.*)—" Certain im-" provements in the treatment of ores." These are as follows:— The ore is roasted in the open air or in kilns or furnaces; " if the " metallic rock gang contains calcareous substances" it is burnt " in a similar manner to lime and dissolved in water; the oxides " &c. of this ore will deposit at the bottom of the vessel." The ores after roasting are powdered, and again roasted in a reverberatory furnace with the addition of " a small quantity of coke, " charcoal, coaldust," &c. The ore after roasting is mixed with an alkaline chloride, in preference chloride of sodium, in certain proportions, moistening the whole if dry, and roasting with stirring " until the smell of muriatic acid becomes less perceptible," and the ore adheres to the workman's tools; the ore is then withdrawn. If the ores do not contain silica " it is requisite to add about ten " per cent." The calcined mass is lixiviated with water containing " sulphuric, muriatic, or other acid." The precipitation, &c., of the metals, " or the formation of other commercial products, " can be effected by the usual processes." " The copper, how-" ever, may be precipitated also by common ashes, lime water, and " caustic water, and the products obtained may be used in the " manufacture of colours, salts, &c., or reduced to the metallic " state. Arsenite or arseniate of copper," " Schieles, or Vienna" green, are made by adding to the solution " a solution of arsenite " or arseniate of potash." " After the lixiviation there remains " in the vessel the powdered metallic rock gold, oxides of iron, " tin, zinc, &c., if the ore contained such metals, which can be " utilized by known means."

[Printed, 4*d*. No Drawings.]

A.D. 1856, March 12.—N° 598.

PONTIFEX, Edmund Alfred.—" Improvements in the manu" facture of tartaric and citric acids, and tartrate of potash and "soda." These are, separating or filtering the liquors from which these acids and salts are formed from the sulphate of lime and other impurities, by pressure through textile fabrics, or by other suitable means, and evaporating in vacuo nearly to concentration; if necessary letting any sulphate of lime or baryta, or other matters held in solution, deposit, and afterwards concentrating the solution to crystallization. The crystals formed are dissolved, and the solution decolorized in the usual way, is evaporated in vacuo and crystallized, "repeating the operation if "required until the crystals are sufficiently pure;" preferring to conduct "the melting in the various re-crystallizations" in the vacuum pan. The apparatus employed is "a lead or other vessel "in which the liquors are to be evaporated or melted, is placed "within another vessel which is exhausted," or "the lead may be "dressed down upon the outer vessel with some pigment or "cement betwen the surfaces so as to expel the air, and the joints "so arranged that no air can enter between them; or glass, "earthenware, or enamelled iron, or other material not affected "by acids, may be used as the evaporating vessel, without the "addition of another vessel to sustain the pressure." Employing "overflow receivers and external condensers." "The over-"flow vessel contains at the bottom a quantity of chalk, milk of "lime, or other alkaline or carbonated solution, through which "the vapour from the vacuum pan is conducted by means of a "pipe terminating in a rose;" above the surface of the alkaline material is "a priming plate perforated with holes for the escape "of the steam," "fixed in the overflow vessel to prevent the solu-"tion being carried away by the rush of steam through it." "The overflow vessel is furnished with suitable cocks and pipes "for the supply of fresh, or discharge of the spent, solution. "The object of employing the solution here is to collect the "acetic, butyric, sulphurous, and other acids that would otherwise "pass over and injure the apparatus." The steam is condensed in preference by "Edmund Pontifex's patent condenser." "To "prevent leakage in the valves and cocks attached to the vacuum "pan, caused by the action of the acid on the metal of which such "valves and cocks are composed," using "a description of valve "or cock, the body of which" is "made of cast iron or other "suitable metal" and lined with lead. Making "the valve face "and disc gland of india-rubber," and securing "the spindle "from the action of the acid by a covering of lead."

[Printed, 10d. Drawing.]

A.D. 1856, March 27.—Nº 734.

BRUNEL, Bonnet Frédéric. — " Improvements in the " manufacture of Prussian blue." These are, first, " the employ- " ment in the manufacture of Prussian blue of oxalic acid and " chromic acid in addition to the ingredients hitherto usually " employed," (" yellow ferrocyanide of potassium, protosulphate " of iron, and sulphate of alumina "), and " the passing of " currents of electricity into and among the same."

Second. The manufacture of Prussian blue by dissolving separately ferrocyanide of potassium, protosulphate of iron, sulphate of alumina, oxalic acid, chromic acid, and " hydrochlorate of per- " oxide of manganese " (this last salt is not mentioned in the Provisional Specification), in proportions which are given, but which may be varied, mixing the first three solutions in succession, then leading the two poles of the battery " into the precipitating " vat, and pass electric currents through the solutions all the " time they are being poured in," stirring the mixture and adding first " the oxalic acid, then the hydrochlorate of manganese, and, " lastly, the chromic acid or bichromate of potassa, keeping up " the electric currents the whole time, and stirring at intervals," and for ten minutes after adding the bichromate. The matters deposited in from 10 to 12 hours are drained on a cloth and may be pressed and dried.

[Printed, 4*d*. No Drawings.]

A.D. 1856, April 18.—Nº 921.

LÜRIG, George.—" Improvements in the process of manu- " facturing saltpetre." This consists " in manufacturing salt- " petre by using common potash of commerce (carbonate of pot- " ash), alkaline sulphates, nitrate of soda, and quick lime, in " variable proportions," and in the following manner :—Carbonate and sulphate of potash in certain proportions are boiled up together until of a certain strength, and the solution poured upon a certain quantity of quick lime, " which is dissolved by it ; " the mixture is stirred, allowed to settle for three or four hours the liquor drawn off into a boiling pan, and the lime residue washed with water, the liquor added to the boiling pan, and the *whole* boiled down to a certain strength, in which state " it may " *be used for* manufacturing hard soap of any kind." In *manufacturing saltpetre* the liquor is concentrated and crystallized several times until the liquor of a certain strength is "only a "solution of potash with which all kinds of soaps can be "manufactured, or from which refined potash (pearlash) can be "obtained." "All the alkalies, alkaline sulphates, and nitrates, "may be used in a similar manner for obtaining the same result."

[Printed, 4*d*. No Drawings.]

A.D. 1856, April 23.—N° 976.

BALMAIN, WILLIAM HENRY, and COLBY, THOMAS.—"Improvements in the manufacture of alkalies from their sulphates." These are said to be "obtaining alkaline carbonates by decom"posing the sulphates of the alkalies with carbonate of barytes." By agitating ground or precipitated carbonate of barytes in a solution of a sulphate of potash, soda, or ammonia, the carbonates of the two former can be evaporated, but that of the latter cannot. "The decomposition of the alkaline sulphate by carbonate of "barytes" can be effected "simply by keeping a mixture of the "two substances in a damp state," but the first process is preferred. In the Provisional Specification it is stated that, "if the "alkali is required in a caustic or free state," caustic barytes is employed, and when the alkali is required "in the state of carbo"nate" the caustic alkali is either first prepared as above and subsequently carbonated "by exposure to carbonic acid derived "from a lime kiln, or eliminated by any of the ordinary pro"cesses," or the carbonate is prepared as above. Nothing is said of this in the Final Specification.

[Printed, 4*d*. No Drawings.]

A.D. 1856, April 23.—N° 978.

WARD, PETER.—(*Provisional protection only.*)—"An improve"ment in furnaces used in the manufacture of alkali." This consists in making "the reverberatory furnaces and the furnaces "of the salting down pans" each "with a chamber or space "open at top between the end or bridge of the fire-place and the "bridge at the entrance of the reverberatory part of the furnace "or pan." "This chamber or space is intended to trap or catch "the dust, sparks, and matters passing from the fire."

[Printed, 4d. No Drawings.]

A.D. 1856, April 25.—N° 992.

ELLIOT, George, and PATTINSON, William Watson.—(*Provisional protection only.*)—"Improvements in the pro-" duction of peroxide of manganese." These are, "in the " use of weak acids to dissolve off the protoxide, leaving " the peroxide of manganese;" muriatic acid is preferred on account of its cheapness. Any known method is adopted for precipitating a protoxide from the chloride of manganese produced in the manufacture of bleaching powder, but preferring lime as the cheapest, and such protoxide is converted by any known methods into a mixture of protoxide and peroxide, but it is preferred to expose it with agitation to the action of the atmosphere.

[Printed, 4*d*. No Drawings.]

A.D. 1856, April 25.—N° 996.

GOSSAGE, William.—"Improvements in the manufacture of " sulphuric acid." These are, "the manufactnre of sulphuric " acid by the use of means which provide for the rapid, repeated, " and effectual mixing of the gases employed in such mannfac-" ture, also which provide for the exposure of such mixed gases " to extensive surfaces moistened with sulphuric acid, or sul-" phuric acid containing nitrous gas, nitrous acid or nitric acid, or " some of their nitrogen compounds." For carrying out the above three different ways are described, but they do not differ in the principle upon which they are constructed. Liquid sulphuric acid containing nitrous acid is made to flow down through a tower of lead lined with vitrified bricks, and nearly filled partly with siliceous pebbles and partly with pieces of coke; whilst hot sulphurous acid gas from suitable sulphur or pyrites burners is made to enter the lower part of the tower. The uncondensed gases in this tower pass through a pipe into a chamber constructed of well vitrified bricks, "set in a cement composed of about equal " parts of sulphur and fine siliceous sand," constructed in a dish of strong lead, which serves to collect any fluid. This chamber is divided by a number of plate glass diaphragms forming a series of inclined planes. Nitrous acid is introduced through a tube into this chamber. Liquid acid is also introduced into this chamber, and any uncondensed gases in this chamber pass into a tower similar to that first described. In some instances currents of high-pressure steam or air are employed to propel the gases "in " violent currents in a direction transverse or otherwise, contrary " to that of the ordinary current of gases passing through the " leaden chambers or other apparatus employed."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1856, April 29.—N° 1016.

TITTERTON, **Charles**.—(*Provisional protection only.*)—" An " improvement in the manufacture of white zinc." This is, "in " place of employing manufactured zinc or the ore of zinc," employing "refuse products containing zinc, and which result in " various branches of manufactures where zinc is made and used; " such refuse consisting of ashes, dross, and skimmings containing " zinc," and combining "these matters with broken coke or " carbon," placing the mixtures in suitable muffles or retorts, and distilling off the vapours of zinc and conducting such vapours into suitable chambers with atmospheric air, and thereby producing white zinc from such refuse.

[Printed, 4*d*. No Drawings.]

A.D. 1856, April 30.—N° 1022.

SPILSBURY, **Francis Gybbon**.—(*Provisional protection only.*) " Separating metals, metallic oxides, and metallic acids from their " ores." This consists in boiling the ore under pressure with a strong solution of caustic potash or soda. With quartz orers of gold the quartz are dissolved leaving the metal as a residuum. With ores of tin (the oxide of tin with quartz or alumina) the quartz or alumina will be dissolved " and the oxide of the metal " will be left in the residuum." " When as in wolfram or tungsten " the metal is in the state of acid," a solution of the tungstate of the alkali is formed "leaving the oxides of iron & managanse, & " other adventitious mixtures in the residuum."

[Printed, 4*d*. No Drawings.]

A.D. 1856, May 1.—N° 1030.

NEWTON, **William Edward**.—(*A communication from Eben Norton Horsford.*)—(*Provisional protection only.*)—" An improved " preparation of phospheric acid." This consists as follows:— " Carefully washed and burned bones," finely ground, are sifted with "stirring into freshly diluted oil of vitriol." "The mass is "stirred from time to time for three days, when ordinarily the "action will be complete and there will have resulted phosphoric "acid, superphosphates, and sulphate of lime with a small pro-"portion of salts of magnesia and soda." "The pasty mass may "be mixed with flour or starch or any farinaceous substance," or "the starch may be leached and the concentrated extract mixed "with freshly burned gypsum while moist, and dried in the sun "or by artificial heat," or it may be mixed with stearine or other fatty bodies and dried. "Bone black may be used instead of "burned bones."

"The object is to attain available phosphoric acid in such form "that it may be intimately mixed with dry alkaline carbonates or "other sensible chemical compound without decomposing them, "except upon the addition of moisture or the application of arti-"ficial heat."

[Printed, 4*d*. No Drawings.]

A.D. 1856, May 9.—N° 1097.

FIRMIN, GEORGE JORDAN.—"Improvements in the manu-"facture of sulphuric, tartaric, citric, and oxalic acids, ammonia, "and cyanides." These are, first, "decomposing organic matter, "by means of nitric acid in a vessel arranged so that the gases "arising from the decomposition are mixed with air or oxygen, "and caused to pass through the liquid mixture." Also "mixing "the gases which escape from the decomposing vessel with air or "oxygen, and forcing them again through the liquid mixture in the "decomposing vessel." Also "absorbing the gases formed in the "manufacture of oxalic acid by causing them to pass through a "tower containing coke or other substances over which sulphuric "acid trickles, and afterwards acting on the sulphuric acid (thus "impregnated with sulphurous acid), by which a further quantity "of sulphuric acid is formed."

Second. "The use of the incondensable waste gases from "the sulphuric acid chamber, and also the incondensable gases "from the manufacture of oxalic acid, in the manufacture of "prussiates, cyanides of potassium, sodium, and calcium, and "other cyanogen salts, by passing such gases over a heated "mixture of carbonaceous matter, iron, and alkali, contained "*in retorts or* reverberatory furnaces." Also "the passing

" the waste gases from the sulphuric acid chamber, mixed with " steam, over heated spongy platinum or other substance, to " form ammonia." Third, " the separation of the solutions of " tartaric and citric acids from the earthy sulphates by passing " over an exhausted surface. Also the concentration of these " solutions in a close vessel connected with an air pump, and " having a man-hole cover so arranged that the pan may be " readily freed from deposits when necessary. Also, the passing " the solution of these acids (when concentrated by heat and " granulated)" on "to an exhausted surface, or the treating such " solution by means of the centrifugal machine for separating " the small crystals."

[Printed, 8*d*. Drawing.]

A.D. 1856, May 17.—Nº 1174.

TITTERTON, Charles.—(*Provisional protection only.*)—" Improvements in the manufacture of zinc and zinc white." These are, first " employing the refuse skimmings and dross obtained " from various branches of manufactures where zinc is employed," by introducing them " into a muffle or retort, mixed with broken " coke or carbon," and having " a tube or passage at the upper " part leading to the white zinc chamber, and a tube or outlet at " the lower part for the passage of the melted zinc."

Second. " When using ores of zinc in the manufacture of zinc " white, in order to obtain cadmium for the most part separate " from zinc white," two chambers are attached to the apparatus; the products in the first chamber contain the cadmium and the second the zinc white. In the passages leading to the chambers are " valves or slides to close one passage when the other is open." The first vapours are passed into the cadmium chamber when the passage is closed, and the oxide of zinc is passed through a screen into the second chamber.

Third. " Constructing the screen in the chambers " by suspending it " on leather or other suitable flexible material around the " frame of the screens, and there is in each case a rod of wire " passing through the frame with stops thereon, so that by pulling " or moving the frame at intervals against the stops " the frame is shaken so " as to detach the oxides from the surface of the " screen."

Fourth. " Subjecting white zinc to hydraulic pressure in order " to obtain 'body' when using it as paint."

[Printed, 4*d*. No Drawings.]

A.D. 1856, May 20.—N° 1189.

MAUGHAM, William.—(*Provisional protection only.*)—" An " improvement in rendering cotton and other fabrics and paper " uninflammable." This consists in impregnating cotton and other fabrics and paper with phosphate of ammonia; and " it is " preferred that that salt should be simply dissolved in water, " and the fabrics impregnated therewith; but the phosphate of " ammonia may be produced in solution by combining phosphate " of soda with a salt of ammonia."

[Printed, 4*d*. No Drawings.]

A.D. 1856, May 20.—N° 1194.

NEWTON, Alfred Vincent.—(*A communication from Rousseau Brothers and Paul Morin.*)—" An improved mode of preparing the " double chlorides of aluminium and sodium and aluminium and potassium." This consists as follows:—The alumina or aluminiferous substance in powder is mixed with an equivalent proportion of sea salt or of chloride of potassium. To this mixture is added either "charcoal, small coal," or "tar, pitch, " bitumen, or any resin or mineral or vegetable oil, &c.," in variable proportion. The whole is then heated in a close vessel until completely calcined, and "the calcined mixture is introduced " into a distillatory apparatus suitable for producing the simple " anhydrous chloride, heat is applied thereto, and dry chlorine " is passed through it." " When the temperature is sufficiently " high, the chlorine will produce a reaction, and the double " chloride will be distilled over and received into a close vessel " in a liquid form; or instead of chlorine, hydrochloric acid " gas may be employed." If the aluminiferous substance contains much iron it is first calcined with any of the above carbonaceous matters, and the iron dissolved out by " an acid more or " less diluted, and is then fit for the production of the double " chlorides as before mentioned."

[*Printed, 4d.* No Drawings.]

A.D. 1856, May 22.—Nº 1225.

BARRUEL, GERMAIN. — " Improvements in treating cotton " seed." These are, " the cotton seen, either whole or in a crushed state," is distilled in a close vessel " gas, pyroligneous " acid, a considerable quantity of ammonia, and a large propor- " tion of fatty matters," are produced. " The cinders produced " by the carbonization of the grain contain, together with other " salts, an important quantity of potash, which may be dissolved " out by water." The gas is purified by lime " which absorbs " the carbonic acid, the ammonia having been first separated by " means of an acid."

[Printed, 4*d*. No Drawings.]

A.D. 1856, May 23.—Nº 1234.

GEDGE, JOHN.—(*A communication from Mathieu Dauriac.*)—(*Provisional protection only.*)—" Improvements in obtaining a " material used in dyeing." These are as follows :—" Alumish " sulphate " (sulphate of alumina) is made by " submitting the " properly chosen argil (clay) to the action of sulphuric acid. " Prussiate of potash throws down from a solution of the same " iron as Prussian blue." The sulphate being refined and properly concentrated is submitted to the action of ammonia, " either " in liquid or as gas, by the action of lime upon the ammoniacal " waters of gas works," the alumina is precipitated, and is washed with water and calcined below a red heat, when it will dissolve in alkalies and acids the solutions to be used as mordants. The sulphate of ammonia drawn off from the precipitated alumina is evaporated to crystallization.

[Printed, 4*d*. No Drawings.]

A.D. 1856, May 31.—Nº 1288.

NEEDHAM, WILLIAM, and KITE, JAMES (Secundus.)—" Improvements in machinery or apparatus for expressing liquids or " moisture from substances." These improvements are, " to " further carry out or perfect the principle " contained in No. 1669, 1853, and a press is described consisting of arrangements of grooved slabs, floats, or trays, between each of which " one, " two, or more cloths or other filtering medium are placed, which " cloths are attached to short pipes," through which the material to be acted upon is forced into the press, "by means of a force pump (or any other adequate means)." "The pump continuing to work "till the liquid or moisture yielding to the pressure finds vent "through the cloths;" in the case of "oils and similar matters" a "trough or receiver of any kind should be so arranged as to "intercept and retain" them. The pressure is applied alternately to the upper and to the lower chambers of the press. "They are "applicable to all manufactures where semi-fluids are to be dealt "with, such as the expression of the water from whitelead and "colours; expressing and washing tartaric and other acids or "chemicals," &c.

[Printed, 10*d*. Drawing.]

A.D. 1856, June 6.—N° 1355.

ELLISON, PAUL.—(*Provisional protection only*.)—"Improve-"ments in furnaces, and the mode of working the same, for the "manufacture of black ash or crude soda." These are, first, "constructing the furnace or furnaces so as to be enabled to "work each charge of the materials on the same bed or bottom "from beginning to end of the operation."

Second. "Arranging the furnace with its fire-places and ash-"holes in such a manner that each charge of materials succes-"sively shall have the benefit of the full heat of the fires before "the charge is withdrawn."

In preference "each furnace should contain not less space than "is equal to eight beds or bottoms; but more or less may be "adopted if thought desirable." A fire-place is between every two beds, and the flues from the same to the chimney are to be placed one at each end of the furnace, each with "a damper, so "that the draft of air through the furnace may be changed or "reversed at pleasure to obtain the required heat for fluxing the "material." "The ash-holes are each to have a door or damper." In charging the material to be acted upon into the beds "a "hopper is placed on the top of the furnace, one over each bed." The mode in which the several charges are worked on each bed is described.

[Printed, 4*d*. No Drawings.]

A.D. 1856, June 9.—N° 1369.

ELLIS, JOHN.—"Improvements in the manufacture of muriate "*of ammonia* and carbonate of ammonia, and in converting "certain ingredients employed therein into an artificial manure." These are, first, "the apparatus employed" in the above manufacture, consisting of, 1st, an arrangement of three stills with condenser. 2nd, one still with an iron box into which the beak of the still enters, from the bottom of which is a draw-off pipe, and from the top of which is a pipe leading into a worm tub. To the exit of this pipe another pipe may be adjusted "to convey the "ammoniacal gas to mix with or impregnate the lime, charcoal, "&c. which is contained in the manure house." Any liquid remaining after the distillation is drawn off from the still by a pipe from the bottom into a cistern. 3rd, a still, &c. similar to the last, but from the worm is a pipe passing nearly to the bottom of a condenser, on the top of which is a valve to relieve the pressure, or "to allow the escape of superfluous gas, &c. therefrom;" another still, for generating muriatic acid gas from muriate of soda and sulphuric acid, is connected by means of a tube with the condenser. The ammonia employed is that described in N° 1616, 1855. The ammoniacal gas and muriatic acid gas in the condenser form muriate of ammonia. The same process "is gone "over to form the bicarbonate of ammonia, excepting that instead "of muriate of soda" carbonate of lime is used. "In the first "instance sulphate of soda is produced, and in the second sul-"phate of lime, both of which "are employed to enrich the "manure." The modes described of conducting the processes are also claimed.

Second. Converting the ingredients into manure; also using the naphtha produced in former patent of itself or otherwise, for the purpose of cleaning all sorts of wool.

[Printed, 10*d*. Drawing.]

A.D. 1856, June 12.—N° 1395.

STENHOUSE, John.—"Improvements in the preparation of a "decolourising material suitable for the treatment of acid, alka-"line, and neutral solutions." These are, "producing a highly "porous vegetable charcoal capable of being employed as a "decolorizing agent" in the above solutions. As an example, in preparing this material one pound by weight of coal tar pitch is gently heated in an iron pot till it melts, when two pounds of fluid coal tar are added and the liquids mixed; "seven pounds of "hydrate of lime *in very* fine powder are next gradually stirred

" into the mass, which soon becomes thick and pasty. It is then " gently roasted, the stirring being kept up during the whole " time, till it is reduced to the state of very fine powder." The dark coloured powder thus obtained is " introduced into ordinary " crucibles or iron retorts and is ignited until the vegetable matter " is entirely carbonized. The mixture when cold is then digested " with dilute hydrochloric acid, washed by decantation, thrown " upon a filter, and again washed by decantation, thrown upon a " filter and again washed until everything soluble is removed. " The porous charcoal remaining on the filter is the decolorizing " agent."

[Printed, 4*d*. No Drawings.]

A.D. 1856, June 12.—N° 1397.

STOTT, George Louis.—(*Provisional protection only.*)—" Im- " provements in purifying gas." These are, causing the gas to pass " over or amongst oxide of zinc, or the carbonate of the " oxide, whereby the sulphur contained in the gas is caused to " combine with the metallic zinc, forming a sulphide of that " metal, and the oxide of zinc so produced may be reproduced " by roasting the resulting sulphide in a current of air, or by " other means known to metallurgists, so that the oxide of zinc " reproduced can be used again."

[Printed, 4*d*. No Drawings.]

A.D. 1856, June 19.—N° 1443.

SPILSBURY, Francis Gybbon.—" Making soda and alum." These are said to be, first, " the extraction of caustic soda from " cryolite by caustic lime and water." The cryolite reduced to powder is boiled with lime for several hours; the liquid evaporated is caustic soda convertible into carbonate of soda in the usual way.

Second, " fluxing of wolfram with cryolite as well without as " with the subsequent application of lime." The wolfram is fused with about half its weight of cryolite in a reverberatory furnace, cooled, and exhausted with water; produces tungstate of soda solution which is evaporated. The soda may be separated from the tungstic acid by adding lime in certain proportions to the solution of tungstate of soda. Tungstate of lime is produced and caustic soda is in solution and is treated as before. In the

Provisional Specification no mention is made of these processes given under this head in the Final Specification.

Third, "the application of sulphuric acid with or without an " additional portion of clay or cryolite for the purpose of pro-" ducing alum." The cryolite previously mixed with clay and sulphuric acid (oil of vitriol), all in certain proportions, is boiled " until all the fluoric acid is driven off." The resulting mass is lixiviated with water and filtered, "evaporated, and crystallized; " yields cubic alum."

[Printed, 4*d*. No Drawings.]

A.D. 1856, June 20.—N° 1450.

RADLEY, William.—" Improvements in machinery, apparatus, " materials, & processes for preparing & treating auriferous, " argentiferous, and cupreous rocks, minerals, and alluviums, " parts whereof are applicable to other purposes." These are, in reference to this subject, first, forming sulphides of gold and silver with an alkaline or earthy sulphide" as follows:—The substance, " quartzose or trappean, is broken into small pieces and calcined " in a close kiln," with or without an alkaline or earthy sulphide " or chloride," at "a full red to white heat," "during one to four " hours," plunging it in preference into hot water. When the mineral is pyritic it is roasted in a kiln with an aperture at top and bottom; from the top is a passage leading to a dust chamber, to "separate all dust from the sulphurous fumes, for use, as herein-" after described." When the pyritic mineral has lost about one-half of its sulphur, it is plunged "into a solution of sulphide " of potassium, or sodium, barium, strontium, or calcium, more " or less concentrated." The first sulphide is preferred, and " especially that kind known as 'liver of sulphur,' or that of " balsam of sulphur;" afterwards calcining it at as high a temperature as can be commanded without fusing the material, passing steam, and in some cases a blast or artificial current of air or other vehicle containing oxygen gas, through the material, to increase the yield of sulphurous acid. "The pyritic matter thus " treated and deprived of all the sulphur that can be by roasting " or lixiviation with a sulphide is withdrawn and when cool is " washed thoroughly and "left to dry is ready for further treat-" ment." When the pyritic substance is withdrawn from the kiln or receptacle after the first roasting it may be sprinkled with any of the sulphides in powder, or a powdered sulphide or chloride may be introduced into the kiln or receptacle and sprinkled upon the incandescent substance instead of steeping it therein."

Second. " The use and application of the machinery, apparatus, " and processes " for making " acids generally from any sub- " stances whatsoever, and especially from pyritic minerals holding " copper, silver, lead, and gold, or either of them," by " compres- " sive action, no matter how or by what means produced."

Beyond the dust chamber mentioned under the first head is " a refrigerating chamber of a cylindrical shape, of bricks, stone, " glass, or other similar material " set in material " capable of " resisting the action of sulphurous acid," and cooled by water. From this chamber a pipe is led into an apparatus described as a " siccatory " in N° 10,652, containing drying materials, as lumps of chloride of calcium, and from thence enter the inlet of a pump described in same Specification as " a ram and plunger pump." The vapours of acid and air from the kiln, " being taken & " exhausted by the ram barrel of this pump, will be condensed " therein to about three atmospheres by the return of the ram, " which, receding from the plunger, will transfer the condensed " vapours into the barrel of the plunger, which, on the next " exhaustive stroke of the ram, will be further condensed to a " sufficient degree within the conduit of the plunger and receivers, " or condensors beyond." This conduit leads into the upper part of a leaden or platina condensor, covered with iron, surrounded with a jacket of water. Into the condensor water is introduced to absorb the acid vapours, and an opening with a valve is made near the bottom to draw off the acid; near the top is " a valve to " permit the continual escape of nitrogen and other non-conden- " sible gases." " A series of condensors will be better to work " than one." " Nitric and hydrochloric acids may be prepared " in a similar manner." Each condensor should have " a sup- " plementary vessel " to receive and hold the water necessary " to recharge the condensor" after discharging its acid. The " condensing main and gas holders " described in N° 10,652 are employed.

[Printed, 6*d*. No Drawings.]

A.D. 1856, June 27.—N° 1515.

JOHNSON, JOHN HENRY.—(*A communication from Etienne Philibert Theodore Tassy de Montluc* and Louis Jules *Gauthier*.)—

"Improvements in the production of carbonate of barytes." These consist in "decomposing an aqueous solution of the sul-"phuret of barium by the aid of carbonic acid gas, assisted by "the presence of a certain quantity of potash soda, or other "alkali." When the carbonate of barytes is precipitated it is washed with pure water and dried. The sulphuret of barium is made "by calcining in close vessels a mixture of sulphate of "barytes and powdered charcoal, or by way of 'cementation,' the "sulphate being broken into small pieces, and calcined in a "furnace similar to that employed in the calcination of lime."

The carbonic acid is the result of the combustion of charcoal, coke, &c. in close vessels fed with air by a blowing machine."

The sulphuretted hydrogen evolved in the process may be burned to produce sulphuric acid; or it is brought together with sulphurous acid into a suitable receiver, "when they will neutra-"lize one another, the resulting products being water and "sulphur."

The carbonate of barytes is very pure, and is used for many purposes, enumerated among which are, producing salts of baryta, and "wholly or partially in place of the carbonates of potash or "soda in the production of silicates," and "likewise as a mor-"dant in dyeing in the state of acetate (or pyrolignite) of barytes, "as a substitute for the acetate (or pyrolignite) of lead."

[Printed, 4*d*. No Drawings.]

A.D. 1856, July 2.—N° 1558.

WILLIAMSON, John, and STEVENSON, James Cochran,—"Improvements in evaporating saline solutions." These are, preventing "the encrustation of salts on the heating surface of "the evaporating vessel" when it "is heated by fire applied at "the sides and not at the bottom of the evaporating vessel." "In the centre of the vessel or pan" a vertical axis is placed, to which arms are fixed, "which nearly reach but do not touch the "side of the pan;" these arms revolve. "A communication is "made from the pan or vessel to another vessel through which "the heated saline solution and the salts in suspension pass. The "salts subside, and the liquor returns through the same or "another communication to the evaporating pan or vessel. The "salts are fished out of the settling vessel by hand labour or any "other suitable mechanical means." The pan may be fitted with a close cover, and the steam formed by the evaporation conveyed away by a pipe and " used for drying materials or heating solu- " tions, or otherwise turned to account."

[Printed, 10*d*. Drawing.]

A.D. 1856, July 7.—N° 1598.

CONDY, Henry Bollmann.—" Improvements in defecating " or purifying acetic acid and other solutions; also in disin- " fecting rooms and other places, and in preserving wood."

These are, using solutions of the manganate or permanganate of soda or potash for the above purposes. In the manufacture of acetic acid the acetate of lime from which it is made is further purified by roasting " in a revolving retort or vessel furnished " with a mechanical agitator, by which the acetate of lime may " be more uniformly roasted, and the impurities more completely " driven off than heretofore." " In order to separate the acetic " acid from the acetate of lime, sulphuric acid is added thereto, " and the mixture is placed in bags and the acetic acid pressed " out, the gypsum remaining in the bags." " This method of " separating acetic acid from acetate of lime" is also employed " to separate the acid from unroasted acetate of lime" when an acid of the ordinary quality is required, and the acetic acid obtained is distilled in the usual manner.

[Printed, 4*d*. No Drawings.]

A.D. 1856, July 15.—N° 1658.

LUCAS, Jean Louis, and DE BRIGES, Albert.—" Im- " provements in preparing certain liquid or solid alimentary " substances from the husk of a certain fruit."

These are, first, " the new application of the walnut husk to " the preparation of liquid and solid alimentary substances, by " combining it with sugar or saccharine substances."

Second. " Treating the walnut husk so as to obtain a juice " capable of being preserved, or a beverage similar to sweet wine " or cider, or a spirit or vinegar, or an unfermented syrop suitable " for mixing with aerated liquors," by placing the husks in heaps, when they undergo a certain amount of spontaneous fermentation, and are converted into a sweet pulp," and by pressing this pulp *the juice is obtained.*

Third. “The mode or modes of treating the walnut husk by “ spontaneous fermentation and the action of heat so as to produce a solid or pasty alimentary substance.”

Fourth. The application of the walnut husk or its juice in lieu of or together with hops in the manufacture of beer.

[Printed, 4*d*. No Drawings.]

A.D. 1856, July 19.—Nº 1705.

CROCKETT, James Lawrence.—(*A communication.*)—“ Im-“ provements in the manufacture of sulphuric acid.” These are, first, “ the general arrangement and construction of apparatus for “ concentrating sulphuric acid.”

Second. “ The application and use of tanks employed “ concentration of sulphuric acid, the bottom and sides of which “ are composed of alternate layers of fire-tiles and sand enclosed “ in a leaden casing,” as follows :—The tank is composed, first, of a layer of fire-tiles not acted upon by acid, the joints of which need not be perfectly tight, then a layer of sand, again a layer of fire-tiles, then another layer of sand, and then “ the leaden “ casing which encloses the above enumerated materials.” A second leaden casing surrounds this last, so as to form a cold water tank, the object of which is to condense any acid in the inner lead casing, which may percolate through the tiles and sand. The furnace opens direct into the heating flue, the bottom of which, forms the roof or cover of the concentrating tank. Near “ the top of the tank is an inlet for the introduction of fresh weak “ acid, and in a similar situation there is an outlet for ” “ the escape “ of the gases and aqueous vapor evolved during the process of “ concentration.”

[Printed, 8*d*. Drawing.]

A.D. 1856, July 19.—Nº 1707.

JUMP, William Astbury.—“ Improvements in the manufac-“ ture of salt.” These are said to be, first, “ the application of “ steam to heating, covered salt pans having double bottoms for “ that purpose.” This is effected by “ high-pressure steam “ within the double bottom, which thus forms shallow steam “ boiler or generator, and there may be one or more furnaces “ underneath it as *customary*; or high-pressure steam may b

" supplied from an independent source, as customarily practised " in such application."

Second. "The steel or other metal pan scratch or scale " scrapers." "The pan bottom is kept scaled by the rotation of " one or more arms, set with a series of steel bars or blades, " which act as pan scratch or scale scrapers."

Third. "The revolving horizontal shaft with arms, cylinders, " and cups, or the like, for promoting evaporation in reverbera- " tory furnaces." "The shaft is placed just below the surface of " the salt water," so that as it " revolves its arms take up a thin " film of salt water, which passing through the flame of the fire, " steam is rapidly generated." "The steam and hot air thus " generated may be used under salt pans or otherwise." "The " arms on the shaft may be flat bars, or one or more cylinders " may be substituted," on the outermost of which are " a series " of cups or small vessels open at one end," "so that as the " cylinders revolve in the salt water, the cups become charged " therewith," and when they rise above the surface, "they expose " a thin body of liquid to the action of the heat from the fire."

Fourth. "The arrangement of reverberatory furnaces, providing " a side receptacle for the salt deposit, and the brine circulating " by the agency of a fan or like means."

[Printed, 6*d*. Drawing.]

A.D. 1856, August 9.—N° 1882.

OWEN, EDWARD.—"Improvements in the manufacture of gas, " and in the obtainment of products arising in such manufac- " ture." These improvements consist in making gas, for illuminating and heating purposes, from brewers' waste hops; any suitable apparatus may be employed for this purpose. It is preferred to dry the waste hops, or to press them before putting them in the retort, and the resulting gas may be enriched by the addition of boghead coal. The charcoal, tar, and ammonia resulting, may be collected and applied to useful purposes.

[Printed, 4*d*. No Drawings.]

A.D. 1856, August 18.—N° 1922.

RICHARDSON, THOMAS C.—(*Provisional protection only.*)— "*The process* for the procuring and manufacturing the sulpho- " *saccharate of* simarubine." Take (treat?) the wood of the

" simaruba tree with acid sulphuricum dilutum until the wood is " exhausted, then filter and neutralize with any earthy carbonates, " so that any excess of acid is neutralized." Evaporate, treat with animal carbon, alcohol, and crystallize.

[Printed, 4*d*. No Drawings.]

A.D. 1856, August 20.—N° 1947.

GOSSAGE, WILLIAM.—(*Provisional protection only.*)—" Improvements in obtaining sulphur and metals from certain ores " and other compounds of metals." These improvements are applicable to the sulphurets of iron, copper, or lead. " Some of " these are found as natural productions, and others are products " of chemical or metallurgical processes or operations." Hitherto " atmospherical air " has been brought into " contact with the " surface of the compound subjected to operation, such action being " usually assisted by the application of artificial heat." But it is proposed that the atmospherical air so applied should be caused to bubble through the compound while in a state of fluidity caused by heat, and producing sulphurous acid gas.

[Printed, 4*d*. No Drawings.]

A.D. 1856, September 8.—N° 2095.

PETRIE, WILLIAM.—" Improvements in the manufacture of " sulphuric acid and the apparatus employed therein, parts of " which improvements are applicable to the manufacture of nitric, " hydrochloric, and other acids." These improvements relate to condensing columns, which it is stated are " further improvements in the construction of these columns, and in the materials " with which they may be filled, and to particular arrangements " or combinations of several of these columns together, and to " the mode of arranging the flow of different liquids in each " part, and to and from the several columns, and in the means of " improving the draught," described in No. 590, 1852. The columns are composed of stoneware cemented together by a cement (principally sulphur and sand), described in No. 1649, 1856. See Abridgements on pottery. " Other parts of this " apparatus, its pipes for the gases and shoots, and vessels for " acids, and porous materials, are best made according to the same " patent." The column is nearly filled with siliceous or granular matter; the gases pass by a pipe into the lower part of the column and pass upwards through pipes, while a filtering plate on the top of the column allows liquid " to fall equally all over the surface " of the sand," " as fast as may be required without accumulat- " ing on the upper surface." Instead of grains of silex, or solid carbon, globules of sulphur, or glass, in preference with little alkali, " coated with a rough surface made by the adhesion of " suitable powder or grit, such as carbon dust or fine silicious " sand," may be used. " In some cases, instead of exposing a " liquid surface on the irregular and discontinuous surfaces of " grains of sand or divided matter, as in the columns just " described," exposing it " on planes or continuous surfaces " placed " one under another, so that the liquor shall fall from one " to the other of alternate ends or sides, as already practised, but " with a rough, though flat surface, similar to a surface of fine " sand."

An improvement on this arrangement is making the plates circular, and " so constructed that both the liquid and the gas " shall pass from one plate to another, by radiating alternately " from and to the centres of the successive plates."

Either form of column described " may be used in many ways " to produce sulphuric acid, either with or without connection " with the ordinary leaden chambers; but where the draught or " power of suction at the vent is weak," the last arrangement is preferred. The apparatus is susceptible of various modifications; thus any of the columns " described as being placed one above " another, may be placed at any other relative level, and the " liquor from one may then be raised up again to flow into the " other, but this is disadvantageous in several ways."

The draught is obtained by any of the well-known means, or by " the use of a series of what are termed venæ contractæ," or by what is called a " pneumatic ram," consisting " of a long tube " having one end connected with the source of draught employed, " and the other end furnished with a light valve opening out- " wards, and so balanced that the inward draught shall cause it " to vibrate, so as to shut and open alternately, and in this tube " near this valve, there are a set of smaller light valves opening " inwards, and a pipe or air chamber connected with the seat of " the valves and with the vent of the apparatus for making the " acid."

The foregoing apparatus, or parts of the same, are also em*ployed in the* condensation or manufacture of " nitric, nitrous,

" and hydrochloric acids," also in the manufacture of oxalic acid by oxidizing and condensing " the waste nitrous gas arising in " that process."

[Printed, 10*d*. Drawing.]

A.D. 1856, September 13.—Nº 2147.

MONOD, Frederic Ducimetière.—" Improvements in the " manufacture of chlorine." These are said to be, " the manu-" facture of chlorine by the direct employment of muriatic acid " gas to the decomposition of the manganese," as follows:— " Muriatic acid gas produced from salt and sulphuric acid " is passed to nearly the bottom of an acid resisting vessel or receiver containing a small quantity of water. " At a few inches from the " bottom of this vessel is a perforated stone or bed, upon which " manganese is placed." " As soon as this water has acquired a " certain degree of acidity and has become heated, the manganese " begins to be decomposed, and produces chlorine, which escapes " from the acidulated water and passes off through tubes in the " upper part of the vessel, which lead it into a leaden chamber to " be washed and purified." The chlorine is passed through water, and "is conducted away from this chamber to reservoirs or other-" wise to be used as required."

[Printed, 8*d*. Drawing.]

A.D. 1856, September 16.—Nº 2161.

NEWTON, Alfred Vincent.—(*A communication from Eben Norton Horsford.*)—" An improved preparation of phosphoric " acid." This consists as follows:—" Carefully washed and " burned bones " finely ground are sifted with " stirring into " freshly diluted oil of vitriol." " The mass is stirred from time " to time for three days, when ordinarily the action will be com-" plete, and there will have resulted phosphoric acid, superphos-" phates, and sulphate of lime, with a small proportion of salts of " magnesia and soda." " The pasty mass may be mixed with " flour or starch, or any farinaceous substance," or it may be mixed " with freshly burned gypsum while moist, and dried in the " sun or by artificial heat; or it may be mixed with stearine or " other fatty bodies and dried," " or the mass may be leached, and " the concentrated extract mixed with burned gypsum or stearine " and dried," *but in preference*, " the pasty mass is leached, and

" the extract concentrated to 25° Baumé," and a certain quantity of this liquid is heated to boiling and a certain quantity of white bone ashes added, and the whole reduced by boiling to less than half its original bulk, and allowed to cool over night, and mixed, first, with wheaten flour and next with potato starch (other flour may be used), both in certain proportions, " when it should turn " out friable or in a state of division." Bone black may be used in place of burned bones.

This powder, among other uses, may be mixed with the dry alkaline carbonates of potash or soda, and " remain in this state " without evolution of carbonic acid until moistened or heated, " thus making it a substitute for cream-tartar and tartaric acid in " the preparation of yeast powder or baking powders."

[Printed, 4*d*. No Drawings.]

A.D. 1856, September 18.—N° 2183.

BAGGS, Isham.—(*Provisional protection only.*)—" Improvements in smelting or reducing copper and other metals from " their ores, and in the manufacture of sulphuric acid in or by " such processes." These are as follows:—The ore, " take the " case of copper as an example," roasted or otherwise, is mixed with " siliceous or other proper material or materials," and the whole fused in a reverberatory furnace. The silicate of iron or slag is skimmed off and air or oxygen, or other suitable gaseous fluid, hot or cold, is forced into the fluid metal through tuyeres. The arsenic is evolved as arsenious acid, which is condensed, and the sulphur evolved as sulphurous acid gas is employed in making sulphuric acid, by " imparting the necessary amount of oxygen " thereto, either in a leaden chamber, as in the present system, or " by catalysis, or by any other proper and convenient method." The oxygen taken up by the copper is got rid of by carbonaceous matters, or by " poling, or by the use of some analogous process."

[Printed, 4*d*. No Drawings.]

A.D. 1856, October 1.—N° 2290.

FONTAINEMOREAU, Pierre Armand le Comte de.—(*A communication from Francesco Selmi.*)—" An improved voltaic " battery." This consists, first, in " the employment of sulphate " of potass, or other alkaline salts of a similiar nature, to form " the exciting solution " of a battery of which the metals are zinc and copper.

Second. "The arrangement of a galvanic battery in which the "copper element is in triple contact at the same time with the "air, the exciting solution, and the zinc element, for producing a "constant power battery."

In carrying out the above, "oxide of zinc precipitates during "the action of the battery," which, calcined and ground with "smoke black, produces a composition having drying qualities." "The zinc may also be reproduced by heating the oxide with "charcoal." "The solution of sulphate of potass becomes caustic "during the action of the battery, and the potass collects on the "copper." "The caustic potass which gathers round the copper "may be collected and used for various operations."

[Printed, 4*d*. No Drawings.]

A.D. 1856, October 8.—N° 2353.

PONTIFEX, EDMUND ALFRED, and OGSTON, GEORGE HENRY.—(*Provisional protection only.*)—"Improvements in the "manufacture of tartaric and citric acids." These are, decomposing "the tartars or argols in the ordinary way by means of "carbonate of lime or sulphuret of barium or any other method, "by means of which an insoluble salt of tartaric acid is obtained, "and after the tartaric acid has been freed from the base with "which it has been combined," adding "to it sufficient sulphate "of barium to neutralize any excess of sulphuric acid present;" then adding "sufficient chloride of barium to decompose any "sulphate of lime that was either originally present in the argols "or tartars or has been formed or dissolved during the before-"mentioned processes." "For citric acid, after adding chalk to "the lime juice and decomposing the citrate of lime so produced "with sulphuric acid," treating "the solutions of citric acid as "before described with reference to tartaric acid."

[Printed, 4*d*. No Drawings.]

A.D. 1856, October 13.—N° 2392.

ELLIOT, GEORGE.—"Improvements in the production of oxides "of manganese." These are said to be, "the purification of "chloride of mangenese from iron by protoxide of manganese, "and the recovery of a mixed protoxide and peroxide from the "chloride of manganese," as follows:—The iron is precipitated in the chloride *of mangenese* solution by carbonate of lime, preferring common chalk, separating "the clear solution contain-" ing chlorides of manganese and calcium," and precipitating " therefrom by lime a protoxide of manganese," which is washed. In conducting this process the protoxide of manganese is exposed as little as possible to the air; for this reason close vessels are preferred. It is not essential to remove the iron first before precipitating the oxide, but it is preferred to do so. Another portion of the solution of chloride of manganese is mixed and agitated "with the precipitated protoxide of manganese" above described, until on testing the solution all the iron is precipitated; the liquid is filtered from the precipitate and boiled down to a salt, which is exposed with stirring in a furnace, in preference using one described in N° 9496. A current of steam may be admitted into the furnace. The chloride of manganese is decomposed, muriatic acid is produced, and is condensed as in making sulphate of soda, and the residue is a mixture of protoxide and peroxide of manganese, which in preference is treated with cold weak muriatic acid, which dissolves out the protoxide leaving the peroxide. The solution from this operation is boiled down and eated as above.

[Printed, 4*d*. No Drawings.]

A.D. 1856, October 17.—N° 2435.

GOSSAGE, WILLIAM.—(*Provisional protection only.*)—" Im-" provements in the manufacture of coal gas used for illuminat-" ing purposes." These are, the " separation of hydrosulphuret " of ammonia from crude coal gas is partly effected by cooling, " and thereby obtaining liquor containing hydrosulphuret of " ammonia; and the separation of the hydrosulphuret of " ammonia is completed, and also the decomposition of sulphu-" retted hydrogen present in the crude coal gas, effected by " the use of sulphurous acid, either in the gaseous state or " dissolved in water. By the action of sulphurous acid on " hydrosulphuret of ammonia, contained in crude coal gas, " sulphite of ammonia is produced, and an additional proportion " of sulphuretted hydrogen is added to the crude coal gas. The " further introduction of sulphurous acid into the crude coal gas " occasions sulphuretted hydrogen, present therein, to become " decomposed, thereby producing sulphur and water, which may " be separated from the coal gas, either by deposition or filtration;

" and thus obtain sulphur as a valuable product, also sulphite of " ammonia, by the same operation by which coal gas is deprived " of injurious sulphur compounds."

[Printed, 4*d*. No Drawings.]

A.D. 1856, October 21.—N° 2475.

PATTINSON, Hugh Lee.—(*Provisional protection only.*)— " Improvements in the treatment of certain salts and oxides of " manganese." These are, taking " a soluble salt of manganese " (preferring the chloride) " dissolving it " wholly or partially in " water," and adding to it " an earthy or alkaline precipitant," preferring lime, " oxide or mixed oxides of manganese," precipitate, and are separated, washed, and dried, and exposed " for some " time to a cautiously regulated heat, considerably below the " melting point of tin," by which means is obtained " a much " larger proportion of peroxide of manganese than the precipitate " originally contained, so much so as to render its application " useful in the arts."

[Printed, 4*d*. No Drawings.]

A.D. 1856, October 29.—N° 2549.

MACALLUM, John.—(*Provisional protection only.*)—" Improvements in the preparation or refining of saltpetre." These are, the crude saltpetre is " deposited in a chamber containing " water," and the whole " agitated mechanically either by agitating machinery or by the introduction of jets of air." In crystallizing out the saltpetre in the later stages of the process, cooling the liquid " by bringing masses or currents of cold water into " contact with the hot liquor." In drying the crystals they are " laid upon a plate or table heated by steam or hot-air pipes, and " this drying completes the article for packing and use."

[Printed, 4*d*. No Drawings.]

A.D. 1856, November 1.—N° 2570.

COOK, Thomas Ainsley.—" Improvements in treating manganese ores." These are, " ridding manganese ores" from " foreign matters by subjecting them to the action of an acid." The ores are treated " with an acid either in a hot or cold state, of " such strength that while it dissolves out the foreign matters, " such as iron, &c., it does not act upon or affect the peroxide of "manganese." "Weak muriatic acid (say about 8° Twaddle) "or sulphuric acid, say about 12° Twaddle," are suited for the purpose, but it is preferred "to use the residual product obtained "in manufacturing chlorine from muriatic acid and peroxide of "manganese." "This product is now almost valueless," but "it contains sufficient free muriatic acid to become available" in this "process for the purification of manganese ores."

[Printed, 4*d*. No Drawings.]

A.D. 1856, November 5.—N° 2596.

TITTERTON, Charles.—"Improvements in the manufacture "of zinc and zinc white." These are, first, "the method of "obtaining zinc and oxide of zinc from the refuse skimings and "dross in cases where such contain metallic zinc, shelled or coated "by oxide in the process of manufacturing oxide of zinc from "such refuse." This is effected in fire-clay muffles or retorts with outlets at the bottom to allow the zinc to run out, and others at the top with short pipes of clay to convey "the metallic vapours "into the oxydising chamber." The charge is mixed "with one-"third its weight of coke or carbon.

Second. "The method of obtaining cadmium from zinc ores in "the process of manufacturing white oxide of zinc," by using two chambers, or one separated. The first contains for the most part the oxide of cadmium, the second white oxide of zinc.

Third. "Suspending the sieve or screen (for the escape of the "vapours) in leather or other suitable flexible material around "the frame, allowing the requisite play, by which means it is "effectually shaken."

Fourth. "Subjecting the oxide zinc to great pressure by "hydraulic, screw, or other powerful presses," whereby "the "density is greatly increased."

Fifth. "Rendering the oxide zinc more dense, and at the same "time improving its colour by heating it to a moderate red heat "and then rapidly cooling it."

[Printed, 8*d*. Drawing.]

A.D. 1856, November 8.—N° 2630.

GOSSAGE, William.—"Improvements in the manufacture of "*carbonates of zinc, of iron, and of manganese, and in the use-"ful application of* such carbonates." These are, first, making such carbonates “ by decomposing solutions of sulphates or chlo-“ rides of such metals by means of carbonate of magnesia, or by “ decomposing such solutions by means of caustic magnesia, and “ subsequently converting the hydrated metallic oxide produced “ into carbonate by means of carbonic acid gas ; ” or by decomposing solutions of the chlorides of these metals by carbonate of lime, or by means of caustic lime, and converting the hydrated metallic oxide into carbonate as above.

Second. “ The useful application of carbonates of zinc, of iron, “ and of manganese (manufactured as herein-before described) “ to the decomposition of sulphuret of sodium contained in such “ alkaline liquors as are obtained by the lixiviation of rough “ soda (black ash) in the well-known soda manufacture, thereby “ producing metallic sulphuret, also carbonate of soda.”

Third. “The useful application of carbonate of manganese “ (manufactured by decomposing solutions of sulphate or of “ chloride of manganese by means of carbonate of magnesia, or “ by means of caustic magnesia, with subsequent application of “ carbonic acid) to the production of black oxide of manganese “ by decomposing such carbonate of manganese (so manufactured) “ by heat in the presence of atmospheric air.”

[Printed, 4*d*. No Drawings.]

A.D. 1856, November 11.—Nº 2650.

CLARK, William.—(*A communication.*)—“ Improvements in “ the manufacture of barytes and strontian and their salts, and in “ their application to various purposes.” These are, first, “ the “ production of chloride of barium or of strontian from the liquid “ residuums of the manufactures of chlorine or chloride of cal-“ cium.” The acid of the liquid residuum from chlorine making is first saturated with native carbonate of baryta or strontian, or with chalk or lime, or oxysulphuret of calcium, and introduced into a furnace in which is “ a mixture of natural sulphate of baryta or “ strontian with carbon in powder,” and the whole heated for some hours, sulphuret of manganese is formed and chloride of barium or of strontium as the case may be; the latter salts being soluble are dissolved out from the insoluble sulphuret of of manganese. Chloride of calcium may be used in place of chloride of manganese, chloride of manganese may be “ trans-“ *formed into chloride of* calcium ” by heating with the residuum of raw soda in excess; chloride of barium is also obtained by condensing the vapours of muriatic acid from the decomposition of salt by bringing them in contact with native carbonate of baryta moistened.

Second. The application of chloride of barium "for producing "artificial sulphate of baryta by mixing" with a solution of the chloride sulphuric acid until precipitation ceases, and decanting the hydrochloric acid from the precipitate; acid residuums from the stearic acid manufacture or other processes may be used in place of sulphuric acid. In tartaric and citric acid manufacture using this salt in place of chloride of calcium. This chloride is also used for "decomposing the plaster contained in selenitical "waters, and for preventing the incrustation of steam boilers," &c.; it is also applied to decompose "nitrate of soda of Peru."

Third. "The application of artificial sulphate of baryta," in painting, "by applying it in two or three coats of distemper, that "is mixed with paste starch or other adhesive matter, and further "fix the colour by means of a solution of silicate of potassium "or of soda;" also fixing it "with lime white or water "of baryta."

Fourth. "The application of nitrate of baryta," decomposing it in a muffle furnace, &c., "the nitrous vapours and the oxygen "being conducted into the chambers of lead and serving to "convert the sulphurous acid into sulphuric acid." Caustic baryta remains; also preparing nitric acid from it by decomposing a saturated solution of the nitrate by means of sulphuric acid.

Fifth. "The application of caustic baryta and of the natural carbonate." The baryta is prepared as above, or the hydrated baryta is prepared by separating "sulphur from the sulphuret of barium or "oxysulphuret" by "means of the hydrated oxide of manganese;" it may be used in place of lime to transform fatty bodies into fatty "acids; the precipitation by sulphuric acid still further produces "a useful material (artificial sulphate of baryta), which does not "take place when employing lime." By "soaking in a solution "of baryta in water objects moulded in plaster," the surfaces after exposure for some days acquire "a great degree of hardness. "When the natural carbonate or sulphuret of barium" is used for saturating pyroligneous acid, a solution of acetate of baryta is obtained. "This salt slightly torrefied to purify it from tar is "*decomposed by* sulphuric acid and produces acetic acid."

[Printed, 6d. No Drawings.]

A.D. 1856, November 20.—N° 2745.

FONTAINEMOREAU, Peter Armand le Comte de.—(*A communication.*)—" Improved apparatus for preparing carbonic " acid gas and inpregnating liquids therewith." " The apparatus, " made portable or otherwise, consists of a cylindrical or other " shaped vessel for containing the liquid to be charged with the " gas, which vessel is placed upon a pivot or suitable support. " At the lower part of this vessel furnished with a piece of " wire gauze, if necessary, is a reservoir for containing the acid " and the carbonate for generating the gas. This reservoir is " provided with a plug, which when removed allows the intro- " duction of the acid and carbonate which are separated from " each other by a partition perforated with holes, in order that the " acid may be gradually mixed with the carbonate. Instead of this " arrangement, the acid may be placed in a separate reservoir, " vertical or otherwise. The gas being thus generated enters " through a small cylinder and syphon tube into a purifying " reservoir, in which it is washed previous to its entering (through " a tube) the vessel containing the water to be impregnated. " When the syphon and tube are to be filled with water, a " bottling apparatus is substituted for the stop-cock screwed to " the bottom of the vessel. The vessels if composed of glass are " protected by a covering of wire or wickerwork." Another form of apparatus for manufacturing ærated waters on a large scale consists of a gas generator, in which is an opening for putting in the carbonate, also a reservoir lined with lead for containing acid, which enters the generator through a suitable valve or opening. These materials are mixed togther in the generator by an agitator fixed on an axis, at the end of which is a pinion wheel gearing with a toothed quadrant, put in motion by a winch handle, or by other means. The carbonic acid gas, when generated, enters the purifying vessel containing charcoal and lime in powder, or " other suitable purifying materials. From this vessel " the gas passes by means of a pipe to the washing vessel, pro- " vided with stop-cocks. The purified gas then enters the vessel " containing the liquid to be charged with gas, which operation is " effected by means of agitating paddles on an axis worked by a " crank. A guage is fixed to the vessel to ascertain the height of " the liquid. On the axis is placed an excentric for working the " pump supplying the vessel with liquid, which when sufficiently "charged with gas is drawn off from the bottling apparatus. To "ascertain the pressure of the gas, a monometer may be employed. "Various modifications of the above apparatus may be made "without departing from the principle of construction."

[Printed, 8*d*. Drawing.]

A.D. 1856, November 21.—N° 2767.

ROBERTS, Thomas, DALE, John, and PRITCHARD, John Daniell.—"Improvements in obtaining and purifying "oxalate of soda, which improvements are also applicable to the "manufacture of oxalic acid." These are, first, "submitting "woody fibre or other organic substances to the combined action "of caustic soda and caustic potash at a temperature of 350° to "400° Fahrenheit," "oxalate of soda in considerable amount is "obtained mixed with carbonates of soda and potash, as also "with a small quantity of these alkalies in the caustic state." The proportions of the salts and the specific gravity of the solution employed, together with the proportion of sawdust or woody fibre preferred, are given. Second, purifying the crude salt by placing it "when perfectly cold in tanks, and submitting it to the "action of cold or warm water," in preference using "a series of "tanks, whereby the partially saturated solution in the first tank "shall flow over the salt in the second and so on, according to "the method known as continuous lixiviation as adapted in soda "ash making." It is stated that the ordinary method of separating "two soluble salts by a process of solution and crystallization is "inapplicable to this mixture, owing to the slight solubility of "oxalate of soda," &c.

[Printed, 4*d*. No Drawings.]

A.D. 1856, November 29.—N° 2830.

ATKINSON, Edwin Senior.—(*Provisional protection only.*)—"An apparatus for condensing vapours, fumes, gases, and smoke "arising from chemical and smelt works." This consists of an apparatus of the following construction:—"One, two, or more "rotating fans in connection with a cistern or condenser," in which is fixed "one, two, or more perforated or false floors," or in some cases using wire gauze, placed one above the other at suitable distances asunder; all these floors are fixed "above the pipe which "*is in* connection with the fan, or above where the pipe of the "*fan enters the* aforesaid cistern." Water, or else a solution of sulphuric, muriatic, or other cheap acid, is poured into this cistern "until the topmost floor is covered over." By this apparatus the fumes, vapors, gases, or smoke are forced into and below the surface of the water, &c., where they are absorbed. In some cases steam is mixed "with the fumes, &c., either in the flues or the "fans, to facilitate condensation." This apparatus may be made of wood or wood lined with lead, or of iron, stone, slate &c., not prejudicially effected by vapours, &c.

[Printed, 4*d*. No Drawings.]

A.D. 1856, December 9.—N° 2922.

MUSPRATT, Edmund Knowles, and **GERLAND**, Balthasar Wilhelm.—(*Provisional protection only.*)—"Improvements in "treating waste liquors produced in the manufacture of chlorine, "and in separating nickel, cobalt, and copper from liquids con- "taining them in combination with manganese and iron." These are, taking "the liquid as it runs from the chlorine still, and having "brought all the metals into complete solution," adding "car- "bonate of lime to precipitate the iron, which is then separated "by filtration, or the iron may be separated by evaporating the "solution and calcining the residue and redissolving all that "remains soluble." "From the filtrate or clear solution copper "is separated by adding sulphuretted hydrogen, and again filter- "ing; the solution now contains nickel, cobalt, and manganese, "from which sulphuret of calcium precipitates nickel, cobalt, and "part of the manganese from which the latter is dissolved out by "weak muriatic acid," leaving the mixed sulphurets of nickel and cobalt from which the two metals are obtained by processes now in use; or the cobalt and nickel may be separated by precipitating with oxalate of lime. "The manganese is separated from "its solution by the addition of lime," and the precipitated protoxide "may be converted into peroxide, and again used in "the manufacture of chlorine." Nickel, cobalt, and copper may be separated as above "from other ores or substances which con- "tain them in combination with manganese and iron."

[Printed, 4*d*. No Drawings.]

A.D. 1856, December 11.—N° 2948.

MARGUERITTE, Louis Joseph Frédéric.—"Improvements "in purifying rock and sea salt." These are, "the purification "of *sea and rock salt* by tranquil fusion, and by decanting or

" pouring off, or by slow cooling." The impurities settle at the bottom. " When the mass in fusion is allowed to run or flow " into cold water saturated with salt the crystals are suddenly de- " crepitated, and become more friable and more soluble on account " of the infinite separation of the particles."

Second, " the purification of sea and rock salt by tranquil " fusion, and by adding carbonate of soda " to precipitate magnesia and calcareous salts; the quantity of carbonate of soda varies, " it should not exceed one per cent.; with one-half per " cent. good results are obtained," &c.

Third, " the purification of sea and rock salt by volatilization." The salt is made " red hot on the hearth of a furnace, to the sur- " face of which a current of hot air is directed, which carries away " the vapours of chloride of sodium into a condenser where they " are held;" the salt thus obtained is of great purity, " resembling " snow."

[Printed, 4*d*. No Drawings.]

A.D. 1856, December 12.—N° 2957.

PEASE, Henry, and RICHARDSON, Thomas.—" Improve- " ments in the manufacture of compounds of alumina." These are, " common salt or muriate of potash is mixed with China clay " or other suitable aluminous material " in certain proportions, and calcined " for about an hour after the mass has become red " hot ;" when cold, sift out the coarse and grind it to a fine powder. The fine calcined mass is then thrown into a reverberatory furnace, at about 300° to 400° F., with a certain quantity of sulphuric acid, and agitated from time to time until the escape of gas has ceased. It is now a dry powder, and is removed from the furnace and exposed to " the atmosphere for a few days, by which it " is much improved in appearance." Sulphates of the alkalies may be employed in place of the chlorides, but the latter are preferred. When the object is to produce a crystallized alum the proportions of clay and muriate of potash differ, and surface heat is employed, and " the materials are thrown into hot water or weak " liquors as they are drawn from the furnace, and the liquor clari- " fied, evaporated in the usual way, will yield ordinary potash " alum." When the alum shale is roasted in heaps the shale is *mixed* previously with " from ½ per cent. and upwards of muriate " *of potash*," and " with or without the addition of factitious " *sulphurets of* iron." When the presence of oxide of iron is not objectionable, as "in the manufacture of brown paper," employing "sulphuric acid or acid sulphate of iron, obtained by "weathering iron pyrites and any common aluminous minerals" or ordinary brick clay, mixed with 5 per cent. or more of common salt; the whole boiled until the acid is neutralized the liquor is syphoned off and evaporated; on cooling it becomes a cake, this is hastened by adding "ochre or China clay."

[Printed, 4*d*. No Drawings.]

A.D. 1856, December 13.—N° 2965.

METCALF, John.—"Improvements in the manufacture of "alum or sulphate of alumina." These are, first, "the making "or manufacturing of crude alum or sulphate of alumina by "mixing China or other clay in a wet state with sulphuric acid, "in contradistinction to using the said clay in a dry or calcined "state as heretofore adopted." The mass during drying is well agitated. The apparatus preferred is a common furnace.

Second, "making or manufacturing a pure alum or sulphate of "alumina from the before-named crude alum or sulphate of "alumina," by dissolving it "in water, then letting it settle," and boiling the clear liquid down "until it becomes solid when "cold." It is stated that "although this alum is not completely "pure it is sufficiently so for many purposes."

Third, "making a completely pure alum or sulphate" from the crude alum above, "by dissolving it in water, and precipitating the "iron contained therein with yellow or red prussiate of potash," or by "any other precipitant that will not injure the sulphate of "alumina by so doing."

Fourth, "making rock alum from the crude alum or sulphate "of alumina," "by dissolving it in water and adding to the clear "sulphate of alumina liquor a saturated solution of sulphate of "potash, sulphate of ammonia, or other salts of the same bases, "until the milkiness or cloudiness ceases to be produced on "adding more;" the precipitate is then dissolved up and the liquid evaporated "to the crystallizing point, and then run it into "the crystallizing vessels to crystallize."

[Printed, 4*d*. No Drawings.]

A.D. 1856, December 16.—N° 2982.

GOSSAGE, William.—(*Provisional protection only*.)—"Improvements in the manufacture of sulphuric acid, and in the "construction of apparatus used for such manufacture." These are, in place of the large rectangular leaden chambers now in use in this manufacture of greater dimensions horizontally, and through which the gases used to pass "in the direction "of their horizontal length," having "the height of the "chambers greatly increased and the proportionate horizontal "area diminished;" also, "the gases employed are caused to pass "through the chambers vertically, either upwards or downwards "or both;" likewise employing "showers of liquid sulphuric "acid, or of liquid nitro-sulphuric acid, in such chambers, falling "from the upper part thereof, to assist in mixing and condensing "gases contained in such chamber," and for the same purpose introducing "jets or currents of atmospherical air moving at high "velocity into such sulphuric acid chambers." Employing in the construction of sulphuric acid chambers certain natural silicious porous stones, "the pores of which are previously filled up by im- "mersing the same in melted sulphur or other suitable material."

[Printed, 4*d*. No Drawings.]

A.D. 1856, December 16.—N° 2983.

NEWTON, WILLIAM EDWARD.—(*A communication.*)—"An "improved process or processes of treating feldspar so that it "may be used as a manure, or for obtaining potash or soda there- "from." This consists in decomposing feldspar by heating it with lime and phosphate of lime for the above purposes. The feldspar, in preference previously calcined, is ground as fine as possible and mixed with half a part of phosphate of lime and three or four parts of lime, and heated in a reverberatory or other furnace for about two hours at a light red heat. "From the original mixture, "containing double silicate of alumina and potash (feldspar), "phosphate of lime and lime (in excess)," are obtained "a mixture "of double silicate of alumina and lime (soluble in acids), phos- "phate of potash and lime (in excess), which may be used as a "manure and which" in contact with water separates into double silicate of alumina and lime, phosphate of lime and lime (in excess) insoluble in water on one side, and caustic potash and a little caustic lime soluble in water on the other; "the lime, if "necessary may be precipitated by a solution of carbonate of "*potash.* Soda or carbonate of soda results when soda feldspar "*is used as above.* The phosphate of lime should be used in a

" very fine state in the above process, and Mexican guano is " recommended for its phosphate, being in a high state of division. " As to lime it should be used either in the water-slacked state or " in air-slacked state."

[Printed, 4*d*. No Drawings.]

A.D. 1856, December 22.—N° 3031.

ROBERTS, THOMAS, DALE, JOHN, and PRITCHARD, JOHN DANIELL.—(*Provisional protection only.*)—" Improvements in the " manufacture of oxalate of soda, which improvements are also " applicable to the manufacture of oxalic acid." These are, " subjecting the woody fibres or organic substances employed in " such manufacture to the action of alkaline salts, with or without " caustic alkalies, at a high temperature in suitable vessels." " The salts of oxalic acid thus produced, when properly purified, " may be converted either into binoxalates or oxalic acid."

[Printed, 4*d*. No Drawings.]

A.D. 1856, December 23.—N° 3044. (* *)

LARK, JAMES.—Improvements in kilns for burning lime and cement. The kiln is made conical, larger above than below; it is covered with a roof, through apertures in which the fuel is supplied, and is surrounded with a double casing, the upper part of which forms a flue space into which the flame enters from the top of the kiln, and from which it is conveyed away to any place where heat is required, and the lower part forms an air space through which a current of air passes, and may be used in the hot state for any operation desired.

"In the centre of the kiln is constructed a shaft, by preference " of brickwork. This shaft rises through the upper part and " roof of the kiln, and a slide or valve is employed to regulate or " stop the passage of air above the charge in the kiln. Outside " of this central shaft is a hollow trunk of firebricks closed at " top, and passages are formed in the upright shaft for air to pass " from the shaft into the space between the brick and the shaft, " and the heated air from the trunk is conveyed away by suitable " flues to the outlets from the space between the lining and the " outer wall."

[Printed, 8d. Drawing.]

A.D. 1856, December 26.—N° 3073.

DEELY, William Clarke.—(*A communication.*)—(*Provisional protection only.*)—" Improvements in reducing copper ores." These are, the ores are first crushed to powder and the powder placed in a vat or vessel made of wood, and if the ores contain much chalk or lime "vinegar (such as is produced from the vinegar plant of " Germany)" is added with water, and mixed together, "thus " preparing these ores for the next process, which is the first " process when the vinegar solution is not required." The next process is agitating with stirrers the ores with muriatic acid and water for several hours, allowing the contents to settle, and drawing off the liquor into a vessel of wood into which pieces of iron are introduced. The copper deposits upon the iron from which it is scraped off, and "thus the copper is reduced from these ores." " After the iron has been taken out of the vessel, the remaining " contents are run into another vessel, in which the acid is purified " and a great portion recovered, fitted for a similar use in reduc" ing further ores."

[Printed, 4*d*. No Drawings.]

A.D. 1856, December 30.—N° 3091.

GILBEE, William Armand.—(*A communication.*)—" Improve" ments in treating beet root for the manufacture of vinegar." These are, first, "the processes of treating beet root for the purpose " of its conversion into vinegar."

There are two processes:—" 1st, *process by defecation.*—The " beet root being washed with care is rasped," then pressed; the juice is introduced into a copper kept at a temperature of 185° to 194° F., "a tannin lye at 46° F." (3½ pints to 22 gallons of juice) is mixed with it, the liquid is boiled and "six drams of sulphuric acid" diluted with seven ounces of water are added to the same quantity of juice. When the liquid is scummed a small quantity of carbonate of lime mixed with water may be added, and the whole boiled for a quarter of an hour "on a worm heated by steam." It is then filtered, evaporated, filtered a second time, and fermented with yeast at certain temperatures from 10 or 11 degrees Baumé, down to 1 degree, and put into casks which have by preference contained alcohol. " 2nd, *process without defecation.*—The juice obtained " *as above* is put to ferment with a small quantity of yeast. " Fer" *mentation having* set in more juice is added but so as not to

" disturb the ferment." When the vat is full, half the wort of fermentation is transferred by a tube "into a second vat, the " addition of wort is continued, and half the second vat is " transferred into a third vat." The same operation goes on and the fermentation is finally finished in a fourth vat. After the liquor is drawn off and settled, common salt in certain proportions is added.

Second. "The process of converting beet root wine so prepared " into vinegar," as follows:—The juice is introduced into an apparatus composed of a cylindrical cask standing on one end; at about six inches from the lid is a bottom, pierced with several conical holes, in each of which is "fixed a piece of string half closing the orifice " and held by a knot." "The liquid which enters through a " tube between this bottom and the lid leaks along these strings " and drips into the interior of the cask, which is filled with chips " of beech tree previously acidified with concentrated vinegar." " In some cases instead of chips corn steeped in vinegar" is employed. "The air is made to enter through openings made " horizontally one inch or two above the real bottom of the cask," and "egresses from the cask through an opening made in the " lid," and passes into a stone worm immersed in cold water to condense any vapours carried away with it. "In order to obtain " a complete acidification the liquid must generally pass three " times through these casks."

[Printed, 4*d*. No Drawings.]

1857.

A.D. 1857, January 3.—N° 33.

BINKS, CHRISTOPHER.—"Improvements in treating ore in " the manufacture of iron and in obtaining products there- " from." These are, first, "the addition, in the manner and in " the relative proportions," of "alkaline matters along with " ordinary fluxing materials." It is preferred to mix "the alkali " or alkaline materials direct with the fuel, and to charge the " furnace with alternate batches of the broken or the roasted ore " and this alkalized fuel," but other ways may be followed. The alkaline matter in preference "is soda, in form preferably of car-

" bonate of soda, but potash or the potash carbonate may also be " employed." The quantity of carbonate of soda which in preference is used " is relatively to the quantity of fuel in proportions " varying from two to ten per cent of the fuel;" but " a larger " proportion of alkali may in some casesbe used with advantage."

Second. " The substitution of alkaline matters in place of lime " and other ordinary fluxing agents for the special and concurrent " purposes of reducing the ore and of purifying the metal, and " of producing simultaneously valuable cyanogen and other " compounds."

[Printed, 4*d.* No Drawings.]

A.D. 1857, January 3.—N° 34.

BINKS, Christopher.—" Improvements in obtaining certain " compounds of cyanogen." These are, first, " the application " of a blast of atmospheric air to alkalized carbon, or the appli- " cation or employment of blast furnaces in the conversion of " alkalized matter into cyanides." Charcoal or other fuel is saturated, in preference, with a solution of common carbonate of soda, although " carbonate of potash, or any elements yielding " an alkali and alkaline carbonate or carburet, may be used, and " these kind of elements are well known." The furnace is constructed and worked as an iron-making blast furnace, " with a " well below the tuyeres holes for reception of the fused cyanide " as it is formed and as it falls or runs down."

Second. " The application or employment in the same manu- " facture of kilns or ovens, worked similarly to coke ovens or to " lime kilns."

Third. " The effecting the cyanizing of the alkali by disposing " and heating it, and its associated carbon or fuel in beds or " heaps " on " the ground, and without the aid of furnaces or " kilns or ovens, as before." " The alkalized charcoal or mix- " tures of alkali and carbonaceous and other matters, are placed " in layers alternately with the fuel, and surrounded with fuel " (which may be damped) " so arranged as to give admission to " air in quantity sufficient to maintain a slow combustion of the " fuel;" the ground below those heaps is hollowed " in order to " receive and protect the cyanide."

Fourth. " The conjoint use of phosphates of lime or other " *phosphorous* compounds, along with alkaline matters and

" carbon, for the production of compounds and mixtures of " cyanides and phosphorus." This is effected in one of the arrangements above described.

[Printed, 4*d*. No Drawings.]

A.D. 1857, January 5.—N° 41.

GOSSAGE, WILLIAM.—(*Provisional protection only*.)—" Im- " provements in the manufacture of sulphuric acid, and in the " construction of apparatus used for such manufacture." These are, in place of the large rectangular leaden chambers now in use in this manufacture of greater dimensions horizontally, and through which the gases used pass through the chambers " in " the direction of their horizontal length," having " the height " of the chambers greatly increased, and the proportionate hori- " zontal area diminished ; " also " the gases employed are caused " to pass through the chambers vertically, either upwards or " downwards, or both ; " likewise employing " showers of liquid " sulphuric acid or of liquid nitro-sulphuric acid in such chambers, " falling from the upper part thereof, to assist in mixing and " condensing gases contained in such chambers," and for the same purpose introducing " jets or currents of atmospherical air moving at high velocity into such sulphuric acid chambers ; " also " the combined use of towers containing coke, &c., in conjunc- " tion with chambers, for the manufacture of sulphuric acid, one " or more of such towers being used for the absorption, by means " of strong sulphuric acid, of nitrous gas or nitrous acid from " the uncondensed gases passing off from such chambers in the " ordinary course of manufacture, and another or more of such " towers being used for the preparation of strong sulphuric acid, " by the evaporative action of hot sulphurous acid gas passing " through such tower or towers ; " also employing in the con- struction of sulphuric acid chambers certain natural siliceous porous stones, " the pores of which are previously filled up by " immersing the same in melted sulphur or other suitable " material."

[Printed, 4*d*. No Drawings.]

A.D. 1857, January 6.—N° 47.

RITTERBANDT, LOUIS ANTOINE.—" Improvements in the " treatment of substances containing earthy phosphates." These are, first, dissolving the minerals or earthy part of the bones in dilute acids, preferring muriatic acid, and decanting the solution from the insoluble matters.

Second. " Precipitating the earthy phosphates from the solution " so formed, by neutralizing the acid when the whole of the " phosphates fall down as an insoluble powder, which may be " collected and dried." This may be effected—

1st. By neutralizing the acid with caustic lime.

2nd. By ammoniacal gas obtained by distilling gas liquor with lime.

3rd. By gas liquor unmixed with lime.

4th. " The acid liquor is absorbed by sawdust, peat, or other " porous substance, and exposed in a dry purifyer to the action " of impure gas, the ammonia of which acts as the gas liquor " in 3rd."

5th. Or treating the acid " solution with crude sulphate of " magnesia, in order to remove the lime and substitute magnesia, " and after decanting" treating "the liquor by the processes 2nd, " 3rd, or 4th, in each of which case the phosphate of magnesia " precipitates, but in this case combined with ammonia in the " state of double phosphate of magnesia and ammonia."

[Printed, 4*d*. No Drawings.]

A.D. 1857, January 7.—N° 57.

CLAUS, Charles Frederick.—" Obtaining tin or compounds " of tin from the scraps or clippings of tinned sheet iron." These are, first, the tin scraps are placed in large open pans and covered with a solution of sulphuret of calcium. On the top of the scraps a box with a perforated bottom covered with coarse canvas is placed filled with sulphur in powder or obtained as afterwards described, and the contents are heated until the liquid boils, continuing " the boiling until all the tin of the scraps is dissolved ; " the scrap thus stripped is then removed from the liquid and a " fresh quantity put in, which operation is repeated until the " liquid will dissolve no more tin." The stripped scraps are " then packed in baskets and passed quickly through diluted " muriatic acid to free it of the sulphuret of iron, after which it " is fit to be worked up again."

Second. Precipitating bisulphuret of tin from such solutions by *an acid, in preference* muriatic acid, decanting the liquid, collecting the precipitate on a filter, washing it, removing it from the filter, drying it in a stove, roasting it into oxide, which is smelted into metallic tin, or "by dissolving the bisulphuret of tin in muriatic acid, when bicholride of tin is formed and sulphur set "free." "The sulphur is again used by adding it to the solution "of sulphuret of calcium" as above described.

[Printed, 4*d*. No Drawings.]

A.D. 1857, January 13.—N° 107.

GOSSAGE, WILLIAM.—"Improvements in the manufacture of "sulphuric acid, and in the construction of apparatus used for "such manufacture." These are, first, "the construction of "chambers to be used in the manufacture of sulphuric acid of "which the height is greater than the horizontal length, and "through which gases employed for the manufacture of sulphuric acid are caused to pass in a vertical or nearly vertical "direction."

Second. "The construction of apparatus to be used in the "manufacture of sulphuric acid," protected "from the destructive "action of such acid and of gases" by a "coating or plaster "composed of melted sulphur mixed with sand and coke, or "mixed with sand or coke."

Third. "The production of a supply of concentrated sulphuric acid" by "causing hot sulphurous acid gas proceeding from "ordinary sulphur burners or pyrites burners to pass through a "tower containing coke or other suitable material, through "which tower sulphuric acid is also caused to pass in such a "manner as to be exposed to the evaporative action of such hot "sulphurous acid gas."

Fourth. The application in the manufacture of sulphuric acid of concentrated sulphuric acid obtained by the action of hot sulphurous acid gas, for the purpose of absorbing nitrous gas, or nitrous acid.

Fifth. The arrangement of apparatus (to be used in the manufacture of sulphuric acid in connection with a chamber or chambers) for the absorption of nitrous gas or nitrous acid by means of concentrated sulphuric acid, such apparatus consisting of a tower or towers containing coke or other suitable material, of which the dimensions are such that the number which expresses in square feet the horizontal sectional area of such tower or towers is not less than one three-hundredth part of the number, which is equal to the cubical capacity of the chamber or chambers worked in connection with such tower or towers when such capacity is expressed in cubic feet.

Sixth. The application in the manufacture of sulphuric acid of such a proportionate quantity of concentrated sulphuric acid, for the purpose of absorbing nitrous gas or nitrous acid (preparatory to such nitrous gas or nitrous acid being again used in such manufacture) as shall be equivalent to not less than three-fifth parts of the sulphuric acid so being manufactured.

[Printed, 8*d.* Drawing.]

A.D. 1857, January 17.—N° 144.

WALKER, Peter.—(*Letters Patent void for want of Final Specification.*)—" Improvements in apparatus employed in distil-" ling, and in the manufacture of vinegar." These are, applying " high-pressure steam for causing a circulation in the liquid from " the wash tun." " This apparatus may consist of a side pipe " placed near the wash tun and in communication therewith " above and below; to the lower end of this pipe a steam pipe is " connected by a tap. When the wash is ready the steam tap is " open to admit steam into the side pipe; the tap between the " wash tun and the side pipe is then opened, and the liquid from " the wash tun is forced up the side pipe and into the upper " portion of the wash tun." " The liquid may be forced in like " manner into the cooler or any other vessel."

[Printed, 4*d.* No Drawings.]

A.D. 1857, January 20.—N° 167.

JOHNSON, Thomas.—" An improvement in purifying alkaline " lees." This consists in " the application of atmospheric air in " numerous steams forced by an air pump or blowing apparatus " through and amongst such lees." In carrying out the above it is preferred to use " a double-acting air pump about five feet " long and two feet diameter." " The dividing of the air into " streams is preferred to be done by means of a coil of perforated " pipe at the bottom of each of the vessels used " or otherwise.

[*Printed, 4d.* No Drawings.]

A.D. 1857, January 29.—N° 260.

SYMONDS, Charles Edward.—"Improvements in the "manufacture of oxide of lead and its salts." These are, first, "decomposing chloride of lead by caustic barytes, caustic lime, "or caustic magnesia, separately or combined," by boiling an equivalent of the chloride of lead with an equivalent of any of the above earths, collecting and washing the oxide.

Second. "The use of the oxide of lead" prepared as above.

Third. "The manufacture of salts of lead, such as the acetate "or nitrate from the oxide" prepared as above.

[Printed, 4*d.* No Drawings.]

A.D. 1857, February 3.—N° 311.

LAMING, Richard.—"Improvements in purifying gas, in obtaining materials useful for that purpose, and in working up "into useful products certain ammoniacal and phosphatic substances obtainable as residues in the purifying of gas." These are, first, "distilling phosphorus from earthy compounds or "mixtures containing phosphate of ammonia and carbonaceous "matter." "When bone or other form of phosphate of lime is "first acted upon by sulphuric acid and then its phosphoric acid "combined with ammonia, either during the purification of gas or "by other chemical means, phosphate of ammonia is one of the "results." The whole is ground up with about half its weight of charcoal dried and distilled; ammonia comes off first and then "phosphorus."

Second. "The combination of means for obtaining simultaneously from the purification of gas by solution of sulphate of "iron two products, namely, sulphate of ammonia and hydrated "peroxide of iron," which is mixed with "lime, magnesia, carbonate "of lime or carbonate of magnesia, or any two or more of them." When the solution of sulphate of iron is saturated, the liquid is drawn off from the precipitate, which is mixed with water and thrown on to sacking over a sand filter. The residue remaining is mixed as above, and may also be mixed with sawdust, &c., and the liquids evaporated for sulphate of ammonia.

Third. "Introducing hydrosulphate of ammonia into the gas "prior to or simultaneously with its entrance into dry purifiers, "charged with materials containing iron in any state, which "enables it to abstract the *sulphuretted* hydrogen and to undergo

" atmospheric revivification alternately with the subsequent re-" moval from the gas of its ammonia and combined carbonic acid."

Fourth. "Converting solutions" containing "ammoniacal " hydrosulphate, mixed or not with ammoniacal carbonate, into " solutions either wholly or in part of free or caustic ammonia by " the agency" of oxide of iron; several ways of doing this are given, among which is filtering the solutions through the porous material. "Admitting water or watery solutions to drench" the porous mixture, "while in the purifying vessels preparatory to " forcing through those vessels a current of air for the revivifica-" tion of the purifying material they contain."

Fifth. "The purification of gas from ammonia," or its compounds, "by washing in a scrubber divided by one or more double " diaphragms, each so constructed that its lower part is a basin " to sustain the acting liquid, into which the upper and perforated " part of the double diaphragm is immersed for distributing the " liquid and the gas."

Sixth. "Receiving the volatile products distilled from gas, " liquor, or ammoniacal washings into a close vessel containing " sulphate of iron in solution, together with either the subsequent " separation and evaporation of the resulting liquor into sulphate " of ammonia, and the mixture and peroxidation of the iron pre-" cipitate, or the evaporation by gentle heat of the mixed products " of the distillation." The iron precipitate is peroxidized by mixing it with sawdust or other porous material, or with lime or magnesia or their carbonates, or instead of making two products the whole is gently evaporated in a flat iron basin, when it becomes solid, for removal to other localities, where it may be separated, " more conveniently."

[Printed, 6*d*. No Drawings.]

A.D. 1857, February 7.—N° 357.

TAYLOR, JAMES, and OWEN, EDWARD.—(*Provisional protection only.*)—"Improvements in the manufacture of yellow prus-" siate of potash." These are applying "brewers' waste hops for " affording nitrogen as a source of cyanogen" in the above manufacture, the "waste hops being substituted in part or altoge-" ther for the nitrogenous animal matter commonly used in such " manufacture."

[*Printed*, 4*d*. No Drawings.]

A.D. 1857, February 10.—N° 387.

PARTZ, August Frederick William. — "An improved " method of evaporating fluids, condensing and absorbing vapors, " gases, and fumes, arresting and precipitating flcoulent, metallic, " or other particles, and transferring heat from air or steam to " fluids and pulverulent substances." These are, for effecting the above purposes, "making use of discs of woven wire, perforated " plates of metal, fibrous substances, or other equivalent material, " which are either by a rotary or reciprocating motion alternately " immersed in and withdrawn from a fluid, a film of which adhering to them they successively present to a current of air or " steam of any required temperature for the purpose of evaporation, or to vapors and gases for their condensation or absorption." In evaporating "cane juice, brine, &c., a current of dry " or heated air is forced through the apparatus by means of a " blast generator or otherwise, and having penetrated said perforated discs and become saturated with vapors of the solution" escapes through a trunk or pipe.

[Printed, 8*d*. Drawing.]

A.D. 1857, February 12.—N° 411.

BAKER, David.—" Improvements in the manufacture of compounds of alumina and of magnesia." These, are "the liquors " obtained from alum rock, or other aluminous shales, by the " application of sulphuric acid to the burnt shales," are evaporated " to about 95° of Twaddel," in preference, about one of clay (China or Dorset) to nineteen of the liquor is well stirred in, the whole solidifies. When using shales, as the Yorkshire, "the compound produced as above explained will consist of sulphate of " alumina, sulphate of magnesia, and clay." "In some cases " sulphate of magnesia obtained as at the Yorkshire alum works, " or manufactured from magnesian limestone, and sulphuric acid " is used as above in place of the alum liquors. These compounds are all applicable to the manufacture of paper, and " otherwise where great purity is not desired." Where greater purity is desired clarified liquors containing only "sulphate of " alumina are evaporated to the proper gravity, about 96° of " Twaddel, and then drawn off to solidify." "When the liquors" containing "both sulphate of alumina and sulphate of magnesia" are evaporated as *above*, "*the* product will be suitable for the paper

" makers and others." The quantity of sulphate of alumina or of magnesia "may be varied from those naturally contained in the " liquors by adding the one or the other when evaporating the " liquor." "When great purity is desired" continuing "the " application of the heat some hours after the liquors" are run off, or "when a known gravity is attained (from 96° to 106° of " Twaddel)" the "sulphate of magnesia being driven off by heat," introducing sufficient "of the soda of commerce or other alkali " to neutralize any free acid." The residuum precipitated in clarifying aluminous liquors hitherto run to waste is dried and used for paper making.

[Printed, 4*d*. No Drawings.]

A.D. 1857, February 21.—Nº 518.

GOSSAGE, WILLIAM.—"Improvements in the manufacture of " soda and potash." These are, first, "the obtainment of sulphur " from alkali waste" by "decomposing sulphuretted hydrogen " gas (liberated from such alkali waste), by means of sulphurous " acid gas, under such conditions as prevent, either altogether " or in great part, the formation of such acid compound or acid " compounds of sulphur which is or are not capable of being " decomposed at ordinary temperatures by sulphuretted hydrogen " gas."

Second, the use of an apparatus named "the mixing tower" " for effecting the mixture and consequent mutual decomposition " of sulphuretted hydrogen gas (obtained from the alkali waste) " and sulphurous acid gas" at certain temperatures. Also the use of an apparatus named "the washing tower" for washing the sulphur from the decomposition of the above gases. The following is a general description of the apparatus for carrying out the above:—To a lime kiln supplied with limestone and coke or coal is attached a vertical shaft or chimney (through which gases generated in the kiln ascend), intersected horizontally by perforated arches; this communicates with a cylindrical iron vessel closed at top, which has a grating or false bottom on which is supported a large quantity of large pebbles so as nearly to fill the cylinder. A vessel at the top supplies cold water, which is run off by a pipe at the bottom. From the lower part of this cylinder is a pipe, which by means of a fan conveys the gas into the upper part of a square or oblong gas-tight chamber containing a number of perforated shelves, on each of which is a layer of fresh alkali waste; from the lower part of this chamber is a pipe for conveying the gas into the upper part of a similar chamber charged in the same way with alkali waste; a pipe from the bottom of this second chamber conducts the gases partly through and partly over a furnace fire of coke or coal into a flue, into which, when needful, steam is supplied. The gases from thence pass into the lower part of a square or oblong tower, intersected horizontally by a number of perforated brick arches named "the mixing tower," and passing upwards enter the upper part of another tower of wood lined with lead, nearly filled with large pebbles, "supported on a grating near "the bottom of the same." Water or other liquid is supplied from a vessel at the top of this tower, and passes off through a pipe from the bottom into a series of receivers for the sulphur; the two chambers containing the alkali waste are supplied with steam by a jet into the top of each. Decomposing in a similar manner "sulphuretted hydrogen contained in mixed gases ob-"tained by decomposing 'alkali waste' with muriatic acid." Decomposing sulphuretted hydrogen contained in such mixed gases obtained from alkali waste by causing hot sulphurous acid gas from burning sulphur or pyrites with atmospherical air to pass into the mixing tower and from thence into the washing tower, "so as to separate uncombined sulphur (thereby produced) in "mixture with water." Decomposing sulphuretted hydrogen contained in the mixed gases from "alkali waste" by passing them through the chamber of a furnace in which a layer of "coke or coal is undergoing combustion by atmospheric air." regulating the quantity of air and coke or coal consumed.

Third, "the use of sulphur obtained by the decomposition of "sulphuretted hydrogen gas (liberated from 'alkali waste') by "by means of sulphurous acid gas, for the production of sulphuric "acid; which sulphuric acid is applicable in the ordinary "manufacture of soda and potash."

Fourth, "the obtainment of an increased proportionate quantity "of caustic soda or caustic potash in the ordinary manufacture "of soda and potash, by the use of an increased proportionate "quantity of small coal in mixture with sulphate of soda or sul-"phate of potash, and lime or carbonate of lime, subjected to fluxing "in such manufacture so as to decompose some carbonate of soda "or carbonate of potash produced by such fluxing, and thereby "*produce caustic soda or* caustic potash; also by decomposing

" sulphuret of sodium or sulphuret of potassium contained in " solutions, obtained by the lixivation of 'black ash' or 'ball " 'alkali,'" by "means of hydrated oxide of iron, of zinc, of " manganese, or of lead, thereby producing sulphuret of the " metal employed and caustic soda or caustic potash." The sulphuret of the metal is decomposed by an acid, and the solution of the metal by hydrated lime or magnesia, thus obtaining hydrated metallic oxide "suitable for decomposing" further quantities of the sulphuret of the alkalies.

[Printed, 1*s*. Drawing.]

A.D. 1857, February 28.—N° 595.

BROOMAN, Richard Archibald.—(*A communication from L. Mesdach.*)—" An improvement in the manufacture of sulphate " of soda." This consists as follows:—Instead of decomposing chloride of sodium by sulphuric acid, doing so by means of " sul- " phurous acid obtained from sulphur, ironstone pyrites, the wast- " ing of sulphurous ores of zinc, lead, copper, or otherwise," by exposing the chloride of sodium to the acid " in the flues of a fur- " nace, or on plates heated by the waste heat from a furnace or " otherwise; or sulphurous acid may be introduced into a solu- " tion of sea salt, or it may be conducted through open channels " into chambers containing sea salt to which water is added from " time to time." "These two bodies reacting upon each other " form sulphate of soda. There are also produced sulphites and " hyposulphites of soda, which are transformed as well as the sul- " phates into carbonate of soda by the ordinary processes."

[Printed, 4*d*. No Drawings.]

A.D. 1857, March 24.—N° 821.

ZIBELIN, Jean Alexandre.—(*Provisional protection only.*)— " Improvements in the fabrication of artificial wines, brandy, and " vinegar." These are " based on the chemical analysis of unfer- " mented grape wine or wort, and the employment of the pro- " ducts given by the said analysis for making a sweet liquid or " artificial wort, submitted to alcoholic fermentation, and treated " in the same manner as the grape wort for making natural " wines." Several formulæ for making wine, &c. are given, in which are the following substances: water, glucose, bi-tartrate of *potassa*, tartaric acid, oak bark, elder flower, citric acid, formic acid, tartrate of potassa and iron, Brazil wood in shavings. This wine, it is stated, "can be converted into vinegar in the same "manner as natural wines."

[Printed, 4*d*. No Drawings.]

A.D. 1857, March 31.—Nº 889.

LAUDER, GEORGE, and IRELAND, THOMAS.—(*Letters Patent void for want of Final Specification.*)—"Improvements in the "manufacture of brine to be used in the manufacture of salt." These are, in evaporating saline liquids, the liquid in the first boiler is boiled under a pressure of 30 pounds and the steam generated in this boiler is carried by a suitable coiled pipe into the bottom of a second boiler in which is sea water, and which is evaporated by steam from the first boiler; the steam after heating the second boiler is carried similarly into the bottom of a third boiler. The steam from the second and third boilers, called in the Specification the first and second evaporators, "is conducted off "through piping laid in a large tank, the contents of which are "thus boiled just as in the former instances in this routine." The liquids as they become concentrated to a certain strength are blown off into the last vessel. The sea water or weak saline liquid which supplies the first boiler is conducted into it through pipes in the second and third boilers. "The solid salt is finally pro-"duced from the strong brine in the usual way."

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 1.—Nº 897.

PAUL, BENJAMIN HORATIO.—"Improvements in the preserva-"tion of stone, either natural or artificial, also of cements and "other similar compositions." These are, "applying to the stone "&c. solutions of the aluminates of soda, potash, or of other "aluminates, also of the zincates of soda or potash, or phosphates "of alumina or zinc in solution by alkalies; also similar prepara-"tions of lead or molybdenum." The aluminates are prepared in preference as follows:—Fusing "50 parts of alumina with 60 "parts of dry carbonate of soda; the alumina expels the carbonic "acid from the carbonate of soda, and leaves an aluminate white "like enamel, perfectly soluble in cold water" but becoming turbid on exposure to the air, which the patentee considers no detriment but the reverse, and which led him to mix with the solution finely powdered substances, such as silica, carbonates of magnesia, baryta, zinc, &c. The zincates of potash and soda may be obtained in preference by boiling "2 parts of hydrated oxide of "zinc in 5 parts of soda or potash ley of specific gravity 1·3." The phosphates and alkali are "much in the same proportion to "each other as with the oxide of zinc experiment detailed above; "and hydrated phosphates are preferred to anhydrous." The plumbate, in preference, is obtained by "fusing peroxide of lead "with an excess of soda or potash," the alkali being in excess. The molybdate is obtained in preference "by deflagrating one part "of native sulphide of molybdenum with three parts of nitre." This salt, in preference, is used on account of its cheapness and easy preparation.

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 1.—N° 909.

OLIVER, JOHN.—"Improvements in apparatus for manufactur-"ing and conveying sulphuric acid." In the Provisional Specification this is said to be, first, in "making sulphuric acid, the "apparatus or chambers used, in place of being connected "together so as to cause the sulphurous acid to be introduced "into the first chamber only, and to flow with the nitrous fumes "into the other chambers in succession as heretofore, the sul-"phurous acid is introduced into the succeeding chambers as well "as into the first chamber," by which it is said "the nitrous fumes "passing from the first chamber to the succeeding ones will be "caused to meet with fresh quantities of sulphurous acid in the "succeeding chambers, by which waste of the nitrous fumes will "be prevented, and a larger product of sulphuric acid obtained in "the chambers." In the Final Specification it is stated that the first part of this "invention has for its object an improved mode "of generating and disposing of the constituent elements of sul-"phuric acid from whatever source obtained;" and the source named is copper pyrites containing arsenic, zinc, and other impurities, to manufacture pure sulphuric acid, from which the apparatus and mode of acting upon them are fully described. The apparatus is an arrangement of pyrites burners, the gases from which are made to pass through tunnels which are immersed in water; the gases then pass into a precipitating chamber in which are a number of cross walls to assist in the deposition of the metallic fumes from the gases; in connection with this chamber is a cooling flue into which is introduced " a stream of highly com-" pressed air that has parted with a considerable amount of its " latent heat or caloric;" this is effected by means of a " double-" acting air pump, constructed so as to carry a stratum of water " upon the upper surface of the piston, and also to admit of a " similar stratum of water to rest upon the bottom of the work-" ing barrel, the steam from which carries off a large amount of " latent caloric rendered sensible by expression;" the gases pass upwards into small mixing chambers attached to the acid chambers. In preference, the nitrate of soda or potash is decomposed in a different apparatus from the pyrites burners, and conducted into the small mixing chambers where it meets the sulphurous acid, and these gases pass beneath a leaden curtain in the mixing chambers and proceed forward into the working chambers. There is a pipe in connection with the air and sulphurous acid flue and the working chambers.

Second, " increased facilities for packing, conveying, and de-" livering sulphuric acid " by means " of iron vessels or chambers " of any convenient size or shape lined with lead, adapted to " barges or railway trucks, such vessels fitted with a pendent or " syphon tube " fixed " to the exterior and interior of the vessels, " with the necessary fittings to effect a union and detachment to " air pumps by which they are to be discharged or charged."

[Printed, 6*d*. Drawing.]

A.D. 1857, April 13.—N° 1036.

RICHARDSON, THOMAS, and BROWELL, EDMUND JOHN JASPER.—" Improvements in treating old or waste railway " wood sleepers and bearers, and in preparing or preserving wood " for railway sleepers and bearers and other works." These are, first, " the distilling old or waste railway sleepers or bearers to " obtain tar or products therefrom suitable for preparing other " wood for railway sleepers or bearers, and other works." The " liquid products of the distillation which are arrested in the hy-" draulic main principally consist of the tar and acetic acid, and " these may be separated and treated in the usual manner."

Second, " the combining with tar used for preparing or preserv-" ing wood for railway sleepers and bearers, and other works, a " chemical solvent, so as to render it sufficiently fluid to be used

" without separating some of the substances which it contains by " distillation." The chemical solvent may be a solution of caustic soda of a certain gravity, " or the liquor known in the alkali " trade under the term of red liquor," likewise of a certain gravity.

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 13.—N° 1040.

SCHMERSAHL, Augustus Edward.—" Improvements in " treating bones for the purpose of obtaining gelatine, size, or " glue, and in obtaining certain useful products from such treat- " ment." These are, first, washing the bones with water " so as to " free them from blood and other such soluble matters."

Second, macerating the bones in dilute hydrochloric acid for several days by which the salts of lime are dissolved out and the gelatine is left, this is washed repeatedly with water, afterwards with milk of lime, and latterly with water. " In that form it is " used as an article of commerce, or it may be boiled down into a " paste or jelly of required consistency."

Third, adding ammonia to the acid liquor, by which " super- " phosphate of lime " is precipitated, and " which may be used as a " manure; the then remaining liquor, being sal ammoniac, may " be cystallized or sublimed for an article of commerce."

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 30.—N° 1215.

BARCROFT, Barnard.—" Improvements in dyeing and print- " ing." These consist of a " chemical mixture to be used in the " place of and as a substitute for tartaric acid in producing blues, " and reducing the shades of pink in dyeing and printing, and " may be produced by first mixing fourteen quarts of sulphuric " acid of the specific gravity, 170° Twaddell, with twelve quarts of " cold water, allowing it to stand till cold;" then taking a " large " vessel and placing it in a water bath, and pouring into the said " vessel twenty quarts of boiling water, and mix therewith forty- " eight pounds of muriate of ammonium and six pounds of white " arsenic, allowing the whole to boil till the solid portions are " dissolved, after which the solution is allowed to cool down to " about 70° Fahrenheit;" then adding the " first mixture," and allowing " the whole to stand till cold," after which adding " three

" quarts of oxymuriate of tin of the specific gravity, 120° Twad-
" dell; in a few days it will be ready for use."

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 30.—N° 1225.

COLLINS, John.—" Improvements in furnaces and flues, and " in kilns and drying chambers." These are, in reference to this subject, the application of toothed or serrated bridges, which " bridges are placed at distances from each other," and " placed " beyond the furnace," and made of "fire-clay or other earthy " material, when placed in flues or tubes of steam boilers, salt " pans, evaporating and boiling vessels and other chambers; also, " the use of toothed or serrated diaphragms when placed in flues." " Fire-clay bridges may be placed within the flues in place of the " diaphragms," when "the furnace is fixed inside the said flue." A number of other modes of constructing furnaces, kilns, and drying chambers are described.

[Printed, 1*s*. Drawings.]

A.D. 1857, May 11.—N° 1320.

SIEMENS, Charles William.—" Improvements in furnaces " and in the application of heated currents." These are, " appli- " cable to puddling furnaces, glass furnaces, furnaces for cupel- " ling and oxidizing lead and other metals, drying stoves, and a " great variety of chemical and other operations." " First, " obtaining currents of heated atmospheric air by means of two " regenerators and one fire or set of fires, by dividing the current " of fresh air after it has passed the one regenerator and before it " has reached the fireplace, by means of valves or dampers."

Second. " Obtaining continuous currents of highly heated air " or of flame, and the products of combustion, by means of two " regenerators and two four-way dampers, or pairs of slides, or " other valves, to be worked simultaneously, by means of which " the currents of heated air and of the products of combustion are " transmitted alternately and in opposite directions through the " regenerators, but pass continuously through the heated chamber " and fireplace."

Third. " Obtaining and passing through a puddling or rever- " beratory or other furnace currents, varying in their chemical " properties from heated air to a thick carbonaceous or reducing " flame, by means of regenerators, in combination with one or two

" or more self-acting or mechanical feeding apparatus, under the
" control of the operator."

Fourth. "Constructing and applying fire-places and regene-
" rators and the heated currents therefrom in such manner that a
" ridge of fuel is fed in from the top of the fireplace, and has its
" surface exposed to and acted upon by a current or currents of
" heated air proceeding from a regenerator;" also, "the applica-
" tion to such fireplaces of the moveable bar or plate, by moving
" which the fire may be moved and fed, and the ashes discharged
" mechanically, without the necessity of opening the fireplace."

Fifth. "Constructing and applying fireplaces and regenerators
" and the heated currents therefrom in such manner that the fuel
" is fed in at the top of a solid inclined plane, and has its surface
" exposed to and acted upon by a current or currents of heated
" air proceeding from a regenerator."

Sixth. "Producing intensely heated flame by mixing a current
" or currents of heated air proceeding from a regenerator with the
" heated gases produced by the partial combustion or distillation
" of coal, effected by the admission (either alone or mixed with
" steam) of a quantity of air insufficient to produce perfect com-
" bustion;" "also, the mode of varying the chemical nature of
" such flame by means of dampers or valves regulating the supply
" of air and gases."

Seventh. "Constructing puddling, melting, and other furnaces
" which require to be opened frequently for inspection or for the
" admission of workman's tools, or for other purposes, in such
" manner that the currents of heated air ascend by a passage or
" passages from the regenerators to the heated chamber containing
" the materials or articles to be heated," whereby is obtained in
" the chamber a plenum, or a pressure equal to, or where required
" slightly greater than the atmosphere, and thus to prevent the
" entrance of cold air at the door or openings."

Eighth. "The construction and application of regenerators
" without or in contact with steam boilers or pans, or similar
" vessels."

Ninth. "Reversing or working the valves and dampers em-
" ployed in working regenerator furnaces mechanically at suitable
" intervals, by means of a stream of water capable of regulation
" acting upon buckets or floats;" "also, regulating the motion of
" the water in a self-acting manner by the changes of temperature
" in the regenerators or in the chimney."

Furnaces constructed according to this invention "may be used "for the manufacture of sulphate of soda by decomposing com- "mon salt by sulphuric acid. The hydrochloric acid gas passes "with the products of combustion through the regenerators, and "issuing from them in a cooled state is more easily condensed than "when it leaves the furnace with the products of combustion at a "very high temperature, as in the ordinary method of manufac- "turing sulphate of soda in reverberatory furnaces. By placing "the regenerators below the furnace and by adjusting the dampers "the air may be made to enter very slowly at the door or working "hole, by which means the workman will not be inconvenienced "by the escape of the acid gas, while the furnace will not be "cooled to any great extent by the small influx of air at the "door."

[Printed, 2*s*. 8*d*. Drawings.]

A.D. 1857, May 13.—N° 1346.

BONNEY, William Wolfe.—(*A communication.*)—(*Provisional protection only.*)—"A chemical composition or agent to be em- "ployed in lieu of or to be substituted for argol, tartar, and "tartaric acid." This is made as follows:—Stannic chloride is first made by dissolving, by little at a time, tin in a solution composed of bay or sea salt, muriatic and nitric acid in certain proportions; to this stannic chloride a certain amount of water and sulphuric acid is added, and when the whole is cold it is added to a cold solution of oxalic acid of a certain strength and mixed together; they are left "to settle for about 24 hours before using."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 16.—N° 1389.

ELLIS, Joseph.—"Improvements in the manufacture of arti- "ficial stone." These are, first, "the manufacture of artificial "stone by mixing powdered marble, shells, calcined bones, "granite, porphyry, malachite, freestone, or other natural stone or "mineral or suitable hard substance with lime and a solution of "silicate of potash or silicate of soda, or both, so as to form a "paste or plastic composition, which is afterwards moulded or "shaped in moulds with or without great pressure, or spread "upon walls, or otherwise employed as an artificial stone."

The silicates are made by melting "one part of sand or of

" quartz reduced to a fine powder with four parts of potash, or " with eight parts of crystallized carbonate of soda or three parts " of dry carbonate of soda; a silicate of potash or silicate of soda " is thus formed, or a compound silicate of potash and soda is " obtained by melting the sand or quartz with the two alkalies." A concentrated solution " is made by dissolving the alkaline silicate in water;" " or the silicate may be obtained in any other " known manner, as, for example, by digesting silica in a solution " of caustic alkali."

Second. " The manufacture of artificial stone by mixing together lime and carbonate of lime in fine powder or flour, with or " without the addition of other stone or burned clay or other " suitable hard substances, also reduced to fine powder or flour, " and slightly moistening or damping the mixture with water and " submitting it to great pressure in moulds."

[Printed, 6*d*. No Drawings.]

A.D. 1857, June 5.—N° 1589.

MUSPRATT, Edmund Knowles, and **GERLAND**, Balthasar Wilhelm.—" Improvements in treating waste liquors " produced in the manufacture of chlorine, and in separating nickel, " cobalt, and copper from liquids containing them in combination " with manganese and iron." These are, separating the iron from these liquors by means of carbonate of lime, &c., and decanting the solution from the precipitate; or evaporating the liquor and carefully calcining the residue and dissolving the salts of copper, cobalt, nickel, and manganese by water. The copper can be separated from this solution by sulphuretted hydrogen, and the nickel and cobalt by oxalates or carbonates; but sulphurets are preferable, and of these sulphuret of calcium or soda waste is employed with advantage, only sulphuret of manganese precipitated with the sulphurets of cobal and nickel " can be at once re-dis" solved by adding muriatic or some other acid." The copper need not be separated first by sulphuretted hydrogen; if not it is found " mixed with the cobalt and nickel precipitate," from which it is separated " by processes now in use." " The liquor which is " separated from the first precipitate of cobalt and nickel contains " all, or almost all, the manganese, and this can be separated by " lime as protoxide, and may be converted into peroxide and again " *used* in the manufacture of chlorine, or for other purposes."

[Printed, 4d. No Drawings.]

A.D. 1857, June 13.—N° 1665.

NEWTON, Alfred Vincent.—(*A communication.*)—" An im-" provement in the manufacture of sulphuric acid." This consists as follows :—Pyrites or any of the metallic sulphurets may be employed. If sulphuret of iron is used it is pulverized and thoroughly mixed with " from thirty-three to seventy-five per " cent." " of either caustic soda, carbonate of soda, sulphuret of " sodium, sulphate of soda, or with corresponding compounds of " potash," or with sulphate of lime, baryta, strontia, or iron. To this compound water alone is added, or water mixed with a little sulphuric acid, and kept moist for eight or ten days, is afterwards moulded into bricks or blocks, which are dried for use. When it is desired " to employ the mixture at once, a smaller quantity of water may be employed." " These blocks are burned in the same " manner in which pure sulphur is ordinarily burned," or they " will burn better in a muffle, heat being supplied by a grate." The sulphurous acid evolved is " caused to combine with oxygen " supplied in the ordinary manner of making sulphuric acid." After calcination the residue contains " sulphate of soda or a salt " of potash and peroxide of iron," separated by water ; " this sul-" phate of soda can be again used for the decomposition of a fresh " quantity of sulphuret of iron or pyrites." " If the burning be not " pushed too far, the residue will contain sulphate of iron soluble " with the sulphate of soda." " If the sulphuret contain copper, " nickel, &c., such metals will dissolve as sulphates, and can be " precipitated before evaporation." " If it be desired to obtain " only the oxides of iron, copper, cobalt, nickel, &c.," " the roast-" ing can be made in an ordinary reverberatory furnace such as " used for the roasting of copper ore." The use of sulphate of soda is preferred. If marle, clay, " or sand containing potash be " used, it will yield also the sulphate of potash."

[Printed, 4*d*. No Drawings.]

A.D. 1857, June 22.—N° 1742.

KNOWLES, Sir Francis Charles.—" The manufacture of " aluminium and of certain re-agents to be used therein." This consists " of a method of preparing the cyanides of potassium and " of sodium, and in the use of those cyanides in the making of " the metal aluminium." To form the cyanides, combining anhydrous carbonate of potash or of soda with fine charcoal in such proportion "as to convert the carbonic acid into carbonic oxide by the "action of heat, and to decompose the alkali used." This mixture with lumps of charcoal is placed in a chamber of fire-clay, fire-brick, or iron, and when sufficiently heated a current of the waste gases from iron blast furnaces, or from a cupola by a blast of air, is passed through it. "The nitrogen contained in these gases "combines with the charcoal to form cyanogen," which, uniting with the metal of the decomposed alkali, "forms a vapour of the "cyanide required, which can be collected." To make the metal aluminium, taking one or other of the above cyanides, "and by "passing the vapour of the chloride of aluminium through or "otherwise combining the same in the form of melted chlorides, "or its vapour, with the melted cyanides, or their vapour," obtaining by double decomposition chloride of sodium or chloride of potassium, and the metal aluminium." "Pure alumina may be "added to the materials to increase the yield of metal and to "economise the cyanide."

[Printed, 4*d*. No Drawings.]

A.D. 1857, June 29.—Nº 1823.

MALTBY, WILLIAM.—(*Provisional protection only.*)—"Improvements in the mode of extracting ammonia and other compounds "from gas, gas liquor, sewerage, and other substances." In extracting ammonia from gas, I cause in preference the latter "to "flow through a vessel containing oil or other fatty matter; the "action of the oil or fatty matter being to cause the ammonia to "leave the gas and enter into combination with it, forming a new "compound. By treating this oily compound with hydrochloric, sulphuric, or other acids, the oil is set free, and a salt "of ammonia is formed, which may be obtained in the usual "manner. The oil may again and again be used for the same "purpose."

"When I make use of a metallic salt or oxide for removing the "sulphuretted hydrogen and sulphur, I propose to use the waste "products of copper and zinc resulting from the action of the "galvanic and other batteries employed for telegraphic, electroplating, and other similar purposes."

"Another method which I propose to employ for removing the "sulphuretted hydrogen, ammonia, and other impurities from gas, "gas liquor, or sewerage, and which I prefer, is as follows:—

"Take a quantity of litharge, alone or mixed with lime or com-"mon salt, one or either, by boiling or otherwise; pass the gas "or liquor over or through the latter, and afterwards through the "vessel of oil before described, the ammonia being separated from "the oil by an acid, as before mentioned."

"When the lime which has been used for purifying has become "saturated with foul gases, I propose to re-purify it by passing "steam from water, mixed or unmixed with atmospheric air, "through it, and afterwards to pass the same steam, with the "impurities it then has suspended or contained in it, through the "vessel of oil, where the ammonia and naptha will be taken from "it, and the sulphurous and other gases may be conducted into "fires, or into a chimney, or otherwise got rid of."

[Printed, 4*d*. No Drawings.]

A.D. 1857, July 3.—Nº 1855.

CROLL, Alexander Angus.—"Improvements in the treat-"ment of liquors containing combinations of sulphur with am-"monia." These are, forming the saturating vessels in which gas liquor, &c. is treated with acids "closed, and in applying "thereto a pipe or pipes in connection with a purifying vessel" containing in preference oxide of iron, or "other purifying "media, by which the deleterious gas is at once conducted from "the saturating vessel to the purifyer, and becomes absorbed or "deprived of the deleterious influence, in place of injuriously "passing into the atmosphere."

[Printed, 4*d*. No Drawings.]

A.D. 1857, July 6.—Nº 1873.

HILLS, Frank Clarke.—"Improvements in the manufacture "of sulphuric acid." These are, first, "the employment of "oxide of iron material which has been used for the purification "of coal gas to furnish the sulphur required in the manufacture "of sulphuric acid."

Second. "The mode of burning off the sulphur from the said "oxide of iron material for the manufacture of sulphuric acid," "in a furnace having a series of shelves ranged one above another "to receive the oxide of iron material in thin strata, and which "shelves are kept red hot with a communication from them to the "*condensing chamber*, and also having apertures with regulators

" (sliding doors) for the admission of air to the shelves." " The " spaces between the shelves are connected together by apertures " formed "at the back and front ends alternately of the shelves, " forming a continuous flue or passage." " A fire-place may be " formed at the bottom of the furnace under the lower shelf, and " flues may be carried from it up the sides and over the top of " the series of shelves."

[Printed, 6*d*. Drawing.]

A.D. 1857, July 23.—N° 2027.

NORRIS, Charles.—" Improvements in the manufacture of " sulphate of alumina and the application of the same so manu- " factured in dyeing, printing, paper making, and such like pur- " poses." "Take any convenient number of hundredweights of " such prepared China clay (in fine powder) whilst it is mode- " rately hot from the usual preparatory apparatus, and mix it by " power or otherwise with about the same weight of sulphuric " acid of specific gravity about 1·750 when at 60° Fahrenheit, or " thereabouts, according to the quantity of alumina contained in " the China clay, the sulphuric acid being at the time moderately " hot from the usual evaporating boilers. One of the said " materials may be used cold, provided the other be sufficiently " hot. This mixture is thrown or formed into a heap of any " convenient size, and the action of the acid on the clay com- " mences spontaneously, proceeding with violent rapidity until " the heap becomes a dry crude sulphate alumina, and when cool " is fit for use or sale, and may be rough ground before being " packed." "If both the ingredients have been allowed to go " cold before being mixed and heaped together they may show " tardiness in combining, but a red-hot poker pushed a few inches " into the heap will immediately commence the action, which " quickly pervades the whole mass, of whatever number of tons it " may consist." The patentee also claims "the use of crude " sulphate of alumina, so produced, in the various arts and manu- " factures in which it can be advantageously employed."

[Printed, 4*d*. No Drawings.]

A.D. 1857, July 28.—N° 2057.

PROCTOR, William.—(*Provisional protection only.*)—" *Im- " provements* in the manufacture of sulphuric acid." These are, employing "a jet or jets of steam for drawing or forcing into "the acid chambers currents of atmospheric air or other gaseous "substance which is capable of yielding oxygen to the gaseous "fumes which are generated in the furnace." The air "may "be drawn direct from the atmosphere, and passing through a "pipe contained in or surrounding the steam pipe will be heated "by the high-pressure steam, and thus presented at a favorable "temperature for entering into chemical combination with the "contents of the acid chamber."

[Printed, 4*d*. No Drawings.]

A.D. 1857, July 28.—N° 2060.

BOBŒUF, Pierre Alexis Francisse.—"Improvements in "preserving and otherwise treating animal and vegetable sub-"stances, and in the purification of oils employed therein, and "which may be used for other purposes." These are, in reference to this subject, "to obtain an alkaline salt adapted for the "preservation of animal substances, the mixed mass of essential "oils obtained from the distillation of one of the substances "alluded to above must be agitated for half an hour with some "caustic alkali."

These alkaline salts, it is stated, appearing to be formed of acids more analogous to phénic acid and creosote than to any other substance, "are designated phénates, and "these soponifiable acid "oils, commercial phenic acid." This acid is obtained by adding to the alkaline solution of the salt an acid; if a mineral acid, say sulphuric, the phenic acid floats on the top. In some cases the "alkaline phénate" is used, and in others the phenic acid; in the "embalming of bodies" either the body is immersed in their solution, or "the method of injection by the carotide" is pursued. "By daily sprinkling hospitals," &c. "with solution of "phénate of soda of one degree, they may be kept clear of fleas, "bugs, &c."

[Printed, 6*d*. No Drawings.]

A.D. 1857, July 29.—N° 2066.

KENYON, Hartley.—(*Provisional protection only.*)—"Im-"provements in the treatment of certain compounds of silica, "alumina, sodium, or potash, and the application of such com-"pound in the processes of printing, dyeing, tawing, paper

" making, or in any other process in which the alumina of " commerce is employed." "To effect these improvements take " two parts of clay or spar, calcined or otherwise, and ground, " or both combined, and add one part of marine salt, muriate of " soda, or nitrate of soda or nitrate of potash, 1½ parts of boiling " water, and dissolve ⅛th part of Glauber salts or acid sulphate of " soda, or sulphate of potash, and add it to the above-named spars " or clays and salt, and put it in a pot or cylinder or any convenient " furnace, and mix with it one part of concentrated sulphuric " acid, 1·850 spec. grav., and drive off and collect in a tower or " jars the hydrochloric acid, or the aquafortis if nitrates are used; " or put two parts of clay, one part of marine salt, or nitrate of " soda, or potash, and two and a half parts of sulphuric acid, " 1·350 spec. grav., or thereabouts; but these exact proportions " are not important. Take the residue and submit it to a furnace " as used by soda ash makers, heated by the residue of heat from " the pot or any kind of furnace until the whole of the hydro- " chloric or nitric acid gases are driven off."

[Printed, 4*d*. No Drawings.]

A.D. 1857, July 29.—N° 2071.

BURNETT, Jonathan.—(*Provisional protection only.*)—" Im- " provements in the manufacture of chloride of lime or bleaching " powder." "I propose, instead of working the stills and " chambers detached, as is now done, to work them all or any " convenient number of them in common, collecting the chlorine " gas as it is produced in the stills into one main or common " pipe, which would convey the gas either directly to the chambers, " or what would be better, to a common reservoir of any con- " venient size, in which it might be cooled and purified from the " muriatic acid gas and vapour it generally contains, by a small " stream of water running through the reservoir. From this " reservoir the gas would then be conveyed by another main or " common pipe to the chambers containing the lime; thus the " stills and chambers would form one common system. In order " to connect them with or disconnect them from this common " system when necessary, during the time the stills or chambers " are being re-charged, each set of vessels would be provided " with cocks, lute syphons, or any other convenient apparatus to " effect this purpose."

[Printed, 4*d*. No Drawings.]

A.D. 1857, July 31.—Nº 2085.

GALY-CAZALAT, Antoine, and HUILLARD, Adolphe.—"An improved apparatus for and mode of manufacturing sul-"phuret of carbon, animal charcoal, and carbonic acid." This consists of a furnace formed of fire-bricks, above which "are grates of fire-clay, having their bars and openings placed alternately; above these is an upper chamber or oven dome-shaped, and the whole is enclosed in a sheet-iron case; there are two doors, one above the other, in the furnace, capable of being shut perfectly tight, but it has no grate or ash-pit. There is a door into the oven for the purpose of placing grates of fire-clay, mentioned above, &c. This door is also capable of being made tight. From the top of the oven is a chimney capable of being closed by a door or lid on the top; in the upper part of this chimney is a reservoir of melted sulphur, from which is a pipe with a tap to allow the melted sulphur to flow down the chimney. A fire is lit in the fire-place, and it is filled with coke at the upper door, which is then closed, while the lower door and the lid on the top of the chimney are left open; when the grates have acquired a cherry red heat, the two doors above mentioned "are "closed and made air-tight like the lids of gas retorts," and the melted sulphur let down upon the grates is converted into vapour, which is caused to travel down through the burning coke, passing off thence into a series of tubes, one of which is near the bottom of a tight vessel containing water, a tube from which allows the escape of some sulphuretted hydrogen. Sulphuret of carbon sinks to the bottom of the water. A modification of this apparatus is employed for making charcoal from bones, as also carbonic acid from carbonate of lime. The bones or lumps of carbonate of lime are in a chamber above the oven, and are gradually dropped on the red-hot grate, and the gas and vapours pass off by a tube below the grate, and are condensed, &c.

[Printed, 6*d*. Drawing.]

A.D. 1857, August 5.—Nº 2116.

BOTTURI, Sebastien.—"An apparatus and oven for the car-"bonization and distillation of all animal and vegetable matters." The ovens, it is said, may among other purposes be employed for "baking bread, plaster, lime, &c., and to extract the chemical "produce resulting from this mode of baking them." They are made of bricks, joined together at the parts where the flame and smoke comes in contact with them with clay, and "the other " side by means of Roman cement. The bricks are crossed one " over the other;" under the ash-pan is a vase containing water. The interior of the oven is covered with Roman cement, and in it is a safety valve, "which gives warning when the vapour is in too " great quantity, and it is necessary to allow it to escape into " vases prepared for that purpose." The flame pipes convey the flame and smoke, after they have "passed through the base of the " oven under the platform," into two chimneys which are on the right and left sides of the oven; after passing through which they are again united, and again divided and passed into two other chimneys, after which, "the flame having lost its strength, escapes " by the discharging chimney." The walls dividing the chimneys support the platforms of refracting clay which forms the base of the oven. At each extremity of the chimney is a stopper, which can be taken away when they are required to be cleaned. A box is inside to contain the matters to be heated; this is filled by a funnel tube; on each side of the oven are glass tubes, through which the volatile matters pass to be condensed. For fluids more volatile a glass dome covers the oven, in which there is a communication with a three-necked bottle communicating with other bottles, the number of which "must be in proportion to the " dimensions of the oven."

[Printed, 1*s*. Drawings.]

A.D. 1857, August 15.—N° 2170.

CLIFT, Samuel.—" Improvements in the purification of certain " gases, and in the application of their products to the manu- " facture of alum." These " improvements consist in the appli- " cation of sulphate of alumina, either in the crude or pure state, " for purifying such gases as contain ammonia, and afterwards " in the manufacture of alum from the products so obtained." " Take sulphate of alumina as it is to be met with in the market, " and known under the various names of aluminous cake, cake " alum, and sulphate of alumina, &c., and break or crush it into " small pieces, say about the size of peas, and place it in the " purifiers as used at the gasworks (or it may be applied to any " *gases* containing ammonia), where it absorbs ammonia and other " *impurities;* and when it has become charged with ammonia

" and other impurities of the gas," "remove it and fill the purifier " again with a quantity of fresh sulphate of alumina." Then " take what has been removed from the purifier, and test it to " ascertain the per-centage of ammonia which it has absorbed, " and if it has not absorbed sufficient ammonia to convert the " whole of the sulphate of alumina into alum," dissolve out its " soluble parts in hot water, and put it in vats to settle, and when " settled draw off the clear liquor and set it aside. When alum " crystallizes out of it in the proportion to the ammonia that has " been taken up by the sulphate of alumina from the gas and the " uncrystallizable liquor, boil down till it becomes a cake or sul- " phate of alumina, and use it over again in the gas purifier; " but when the sulphate of alumina taken away from the gas " purifier contains more ammonia than is necessary to convert it " into alum, add sufficient sulphuric acid to it to saturate that " excess of ammonia, and sufficient sulphate of alumina to form " crystallized alum, and then dissolve out all its soluble parts in " water, and set it aside to crystallize."

[Printed, 4*d*. No Drawings.]

A.D. 1857, August 22.—N° 2230.

GATTY, Frederick Albert.—" Improvements in the manu- " facture of chlorine and sulphuric acid." These are, first, " transforming the chloride and sulphate of manganese into " nitrate of manganese, for the purpose of obtaining or repro- " ducing black oxide of manganese," by adding to the chloride or sulphate an equivalent of nitrate of soda or nitrate of potash, drying the mixture, and afterwards heating it to a low red heat in an iron retort until all the fumes are given off, " the black or per- " oxide of manganese is freed from the sulphate of soda or chloride " of sodium, by simply dissolving the latter soluble salts in water, " and letting the black oxide of manganese settle to the bottom " of the vessel."

Second. Applying the vapours or gases disengaged during the decomposition of nitrate of manganese in the manufacture of sulphuric acid. The vapours or gases are passed " at once into the " leaden chambers," or they are passed through condensers, using " only the uncondensed gases for the manufacture of " sulphuric acid."

[Printed, 4*d*. No Drawings.]

A.D. 1857, August 31.—N° 2282.

SPENCE, Peter.—(*Provisional protection only.*)—" Improvements in the manufacture of sulphuric acid, and in obtaining " salts of ammonia." These are, " causing the sulphurous acid " and other gases escaping from the chambers employed in the " manufacture of sulphuric acid to pass through a vessel into " which ammoniacal gas water is introduced, so as to mingle with " the said gases and effect their decomposition or combination,' " sulphate or sulphite of ammonia " are obtained, " which may " be employed in the manufacture of alum," &c., thus preventing " the escape of sulphurous acid and sulphuretted hydrogen." The decomposing chamber is supplied " with coke or other such " substance, in order to gain an extended surface."

[Printed, 4*d*. No Drawings.]

A.D. 1857, September 12.—N° 2379.

GOSSAGE, William.—" Improvements in the manufacture of " soda and potash." These are, first, " the obtainment of sul- " phuretted hydrogen gas, also of lime, by the action of steam " at a high temperature on alkali waste produced in the manu- " facture of soda and potash." The alkali waste is heated in a kiln-shaped chamber, while steam is introduced into it by " a pipe from a boiler, and air is forced into the ash-pit by a pipe " communicating with a blowing machine," " percolates through " the alkali waste," resting upon a grating. The steam may likewise be introduced into the ash-pit. Coke is mixed with the alkali waste in the upper part of the kiln on a series of inclined shelves of brickwork, "on which alkali waste is supported previ- " ously to its being passed into the chamber;" a pipe at the top conducts the gases produced to other apparatus.

Second. "The obtainment of sulphur from sulphuretted hy- " drogen gas so produced." When the alkali waste is decomposed by steam in retorts heated externally, the gas so obtained is sufficiently pure to be burnt with air, but if heated as above described, it is decomposed as described in No. 518, 1857; or converting " all or nearly all the sulphur contained in such " sulphuretted hydrogen gas into sulphurous acid gas by causing " *such sulphur* to become burned with atmospherical air," pre- *ferring* " *to* effect the conversion of the sulphurous acid gas so "produced into sulphuric acid," by the means described in No. 2569, 1857.

Third. "The application of sulphuretted hydrogen so pro-" "duced, and of sulphur obtained therefrom, in the manufacture" "of sulphurous acid and sulphuric acid."

[Printed, 8*d*. Drawing.]

A.D. 1857, September 18.—Nº 2419.

IMHOF, DANIEL. — "Certain improvements in machinery "adapted to the exhausting or forcing of air, gases, or vapour, "and in the application of such machinery to various useful "purposes." These are, first, "certain contrivances in the "arrangement and disposition of the moveable parts of bellows so "as to be double acting when in motion, and so combine one or "more of these bellows, working them each at different periods of "time, that the pallets or valves in the whole combination or series "of bellows may be taking in and letting out air, gases, or vapour "alternately, thereby causing a steady stream or current."

Second. "Arranging the pallets and pallet-boxes of such "bellows at one end, and free from the moveable parts of the "bellows, not to have holes in the bottom and top boards," also arranging "the several bellows which are to work by cranks "and connecting rods centrally between each series, producing a "regular and steady alternating motion." Several forms of bellows upon the above principles are described, and it is said that these machines are "adapted to the exhausting of vapour" from the drying rooms of salt works and chemical works, &c. &c.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1857, September 23.—Nº 2463.

BAKEWELL, FREDERICK COLLIER.—(*A communication rom George Thompson.*)—"Improvements in the preparation for use of "caustic alkalies." These are, "putting up the caustic alkalis, "soda, or potass into small air-tight packages" of very thin sheet iron with a lap joint down the side of each. The top and bottom consist of circular discs of thin sheet iron, the edges of which are turned up by machinery. The bottom is "fastened on by "an infusible cement made of fire-clay mixed with linseed oil or "of other suitable materials;" the fused caustic soda or potash is filled in and the top put on with cement, and the whole baked in an oven until the cement is dry, when it is "dipped into varnish "to ensure the perfect sealing of the case."

[Printed, 4*d*. No Drawings.]

A.D. 1857, September 26.—N° 2486.

HENRY, Michael.—(*A communication.*)—"Improvements in "the manufacture of artificial wine, vinegar, and brandy, part of "which improvements is applicable in the manufacture of brandy "generally." These are in relation to this subject, manufacturing artificial vinegar by employing for the purpose artificial wine produced by combining "the constituent ingredients found "to compose natural grape juice, wort, or must," and fermenting them by yeast or ferment, giving them an aroma by adding "elder flowers. Florentine iris, alcohol of raspberry, unripe "plums, and sloes or bullaces, unripe fruit of the mountain ash "or sorb tree, &c.," "formic, citric, tartaric acid, &c.," "tartrate "of potassa, iron, &c." The other ingredients composing the wort are water, glucose or cane, or beet-root sugar, or other saccharine substance, bitartrate of potassa, tannin, either pure or in a state of oak bark, or other substance yielding tannin, to which is added beer yeast or other leaven or ferment, &c.

[Printed, 4*d*. No Drawings.]

A.D. 1857, September 30.—N° 2517.

HENDERSON, William.—"Improvements in treating certain "ores and alloys, and in obtaining products therefrom, and in "recovering or reproducing all or part of the materials used." These are, in reference to this subject, first, "the reproduction of "the muriatic acid employed in the extraction of metals by "decomposing the chlorides," the "utilization of the bases," the "production of the several commercial salts and products in "connection with the extraction of copper from the ores men"tioned," and "separating the copper and tin contained in alloys "of these metals and the manufacture of sulphate of copper, "stannic acid, and oxide of tin from the bye-product called white "metal." When an alkaline earth is used to precipitate the metallic oxide from its solution in hydrochloric acid there is *obtained a solution* of "chloride of calcium, magnesium, barium,

" or strontian, or a mixture of either," which is concentrated by evaporation, and decomposed by running it gently upon a mass of red-hot sand in a reverberatory furnace, with stirring and keeping up the heat, a silicate of the alkaline earth is formed and hydrochloric acid is evolved and condensed. If it is "desired to " obtain the bases as well as the acid," the solution of the chloride is evaporated to dryness and fused in a reverberatory furnace, while steam, in preference superheated, is blown into the mass " until no more muriatic gas is given off." If iron was used to precipitate the copper, "to obtain the muriatic acid from the chlo- " rides of iron, the solution must be gently evaporated to dryness " and slowly calcined" in a furnace described in Nº 1672, 1853, with a current of damp steam passing over it with stirring the chlorides "may be entirely decomposed." "To produce Epsom " salts" the solution of chloride of magnesium is evaporated to dryness, and the dry salt is treated "with sufficient strong hot " sulphuric acid as will effect its decomposition;" "this is per- " formed in the same manner as is the case of common salt, and " the muriatic acid is obtained and condensed also in the same " manner. The anhydrous sulphate of magnesia thus produced " is dissolved in water" and crystallized. When a compound of barytes has been employed as the precipitant the solution of chloride of barium resulting is treated with sulphuric acid, and is thus obtained "the muriatic acid in solution, and enameled white " (sulphate of barytes) as the precipitate, which when washed " and pressed is fit for the market." When the ore under treatment is a phosphate or arseniate the solution of the ore in hydrochloric acid when cold is, first, "neutralized with carbonate of " lime or other alkaline earth; chloride of calcium or other alka- " line earth is then added, as long as a precipitate falls," which is the insoluble phosphates and arseniates of the alkaline earths. The copper in the supernatent liquid is precipitated by any of the methods described. Phosphates of copper, &c., without the existance of free oxides are dissolved in muriatic acid, and the solution exaporated to complete dryness condensing the muriatic acid, the residue fused with caustic or carbonate of the alkali, the result is oxide or oxides of the metal or metals, and "phosphate " of the alkali used." Alloys of copper and tin (white metal) are crushed to a powder, which is placed " on the top lid of a double " calcining furnace, and the heat gradually raised to a bright red " *heat stirring well all* the while." When thoroughly oxidized it is introduced into a "vessel containing dilute sulphuric acid and "heated by steam;" on settling the solution of sulphate of copper may be "run off to crystallize," or "may be precipitated "as metallic copper with formation of sulphate of iron, as is well "understood." The oxides of tin are washed, and "may be "reduced to metallic tin in the usual manner."

[Printed, 4*d*. No Drawings.]

A.D. 1857, October 6.—N° 2569.

GOSSAGE, William.—"Improvements in the manufacture of "sulphuric acid." These are, first, "the manufacture of sulphuric acid by causing liquid sulphurous acid to be exposed "to currents or minutely divided streams of atmospherical air "so as to cause absorption of oxygen therefrom, and consequent production of sulphuric acid." The sulphurous acid may be obtained from alkali waste as described in N° 518, 1857, or from other sources in which are included such sources as afford the gas mixed "with such a proportionate quantity of other gases "as to be unsuited for the economical manufacture of sulphuric acid by the means ordinarily employed for such manufacture."

The mixed gases from the first manufacture are conducted through leaden pipes exposed to the air; then through leaden pipes immersed in cold water, and into the lower part of a tower filled with small pieces of coke supported on a false bottom; water descending from the top dissolves the ascending sulphurous acid "producing liquid sulphurous acid which flows from the "lower part of such tower." This liquid sulphurous acid is made to flow down through a tower like the above, while air is drawn upwards through such tower. "The weak sulphuric acid "obtained" is used "in place of water in the tower through "which mixed gases containing sulphurous acid gas are caused "to pass," and exposing it again to air, and so on until of a proper strength. Also causing minute streams of air to be forced by an air pump through liquid sulphurous acid forming sulphuric acid.

Second. Making sulphuric acid by injecting steam into liquid sulphurous acid until the liquid rises to about 150° F., and passing the gas nearly pure into leaden chambers.

[Printed, 4*d*. No Drawings.]

A.D. 1857, October 13.—Nº 2616.

BELL, Thomas.—" Improvements in the manufacture of alkaline " salts." These are, first, distilling " old or refuse leather or " bones," in " an iron retort, such as that usually employed in " gas making," and the gases and vapors are passed into a coil of pipes; " the tar condenses and is drawn off at the lower part of " each of the convolutions of the coil," and the gases and vapors " are conducted into a series of vessels, say five or six in num- " ber, connected together, containing sulphuric or hydrochloric " acid of commercial strength mixed with an equal volume of " water;" or the products of distillation may be conducted into sulutions of sulphate or muriate of soda or potash of a certain strength, in this case besides obtaining a solution of muriate or sulphate of ammonia a " precipitate of bicarbonate of soda or " potash " is obtained, which is separated in bags and " may be " roasted to convert it into the neutral carbonate." " The clear " liquid drawn off from the precipitate is evaporated to the proper " strength for crystallizing out the sulphate and muriate of am- " monia, and the mother liquor which contains principally sulphate " or muriate of potash or soda is returned to the decomposing " vessel."

Second. Distilling spent or saturated oxide of iron gas purifying materials into vessels containing sulphuric or hydrochloric acid; a solution of ammonia salt is obtained, and the sulphur falls to the bottom and is collected; the pipe conveying the vapors does not dip in the acid.

Third. " In order to economize fuel, and to avoid loss of am- " monia," employing a pan having " a series of tubular flues " passing through it furnished with a close cover," with " air " pumps or other apparatus to maintain a vacuum in the pan " during the process of evaporation."

[Printed, 4*d*. No Drawings.]

A.D. 1857, October 15.—Nº 2639.

RICHARDSON, Thomas, and PRENTICE, Manning.—" Im- " provements in the manufacture of salts and preparations of " phosphoric acid." These are, in reference to this subject, " the separation of carbonates of lime and magnesia from " coprolites and other substances containing phosphate of lime." This is effected by calcining them in a reverberatory furnace having two beds, the bed furthest from the fire "being covered "with the fresh charge which is being heated up by the "surplus heat, whilst the charge nearest the fire-bridge is "being worked off." "When an average sample drawn "from the first bed of the furnace and moistened with water "ceases to effervesce on the addition of a strong acid, the calcination is complete, and the charge may be removed." The charge on the second bed is now pushed forward and its place supplied with fresh material. The calcined material is ground very fine and thrown "into pits or cisterns and covered with water to the "depth of two or three feet." The water should be rain or spring water, not too hard, but it is preferred "to employ sea water or "water containing salt or a little muriatic acid, which promotes "the solution of the lime." "The calcined materials are agitated "from time to time and then allowed to subside," and the liquid drawn off, and the washing repeated until no more lime is dissolved, ascertained by the taste and also by "any of the ordinary "tests for lime." This material "may be employed for the "manufacture of superphosphate of lime or other preparation of "phosphoric acid," or it may be dried and "substituted for most "of the purposes for which pure bone ashes are now employed."

[Printed, 8*d*. Drawing.]

A.D. 1857, October 28.—N° 2742.

FRASER, John.—(*Provisional protection only.*)—"Improvements in the manufacture of saltpetre." These are, "treating "muriate of potash with nitric acid," "instead of using nitrate of "soda added to muriate of potash." "In this way saltpetre of "superior purity is obtained, and muriatic acid of high commercial value is also produced as a manufacturing result."

[Printed, 4*d*. No Drawings.]

A.D. 1857, November 4.—N° 2801.

DUBUS, Romain Ignace Charles.—"A method of treating "certain plants or vegetable substances in order to extract from "the same, 1st, a kind of fecula or farina, proper both for alimentary and finishing or starching purposes; 2nd, an alcoholic "liquor; and 3rd, a natural ferment or yeast." This consists in "the application of bulbs or roots of the lily tribe to the manu-"facture or production of the useful articles or products," as follows :—In preference "the bulbs of that kind of lily, known as " the Turk's cap lily," is used. After washing and removing the fibrous roots the bulbs are mashed in a mortar to a mucilaginous pulp, a quantity of water about 75° F. is poured upon it, and after steeping " it is placed on a hair sieve and the glutinous water that " runs away is to be collected;" "fresh quantities of water are " from time to time poured on to the pulp until the matter that " remains on the sieve will no longer stick to the fingers and " has the appearance of washed bran. In this state it may " be employed as food for cattle or for the manufacture of " paper. The fecula contained in the mucilaginous water is " deposited at the bottom of the vessel, from whence it may be " taken and washed several times in pure water," and washed through a silk sieve and ultimately collected and dried and passed through a fine silk sieve. Into the mucilaginous liquor "is " poured a small quantity of yeast, which will induce alcoholic " fermentation. After about 24 hours the liquor will become " clear and give off a vinous odour, when it may be used for distillation or for making vinegar by the ordinary process. At the " bottom of the vessel, after fermentation, will be found a considerable quantity of yeast." Or the bulbs may be dried, ground, &c. and made into bread.

[Printed, 4*d*. No Drawings.]

A.D. 1857, November 10.—N° 2839.

TOWNSEND, Joseph.—(*Provisional protection only.*)—" Improvements in the manufacture or production of sulphurous " acid." These are, "treating pyrites and sulphates, sulphurets, " sulphites, and hyposulphites of various kinds in a suitable furnace," as follows :—The furnace is primarily heated by "fuel " in the usual way, and a layer of pyrites is placed upon the fire, " and over this layer is deposited a layer of a sulphate, sulphuret, " sulphite, or hyposulphite." The salts preferred to be used in this process are sulphate of soda, sulphuret of calcium, sulphite and hyposulphite of lime, "but various sulphates, sulphurets, " sulphites, and hyposulphites may be employed."

[Printed, 4*d*. No Drawings.]

A.D. 1857, November 13.—N° 2862.

BESSEMER, Henry.—(*Letters Patent void for want of Final Specification.*)—" *Improvements* in the treating and smelting of

" iron ores, and in obtaining products therefrom." These are as follows:—Iron ores for "the greater part" contain "phosphate of " lime, phosphoric acid, or phosphorous in some other state of " combination, and in such quantity as greatly to influence the " quality of the crude metal obtained therefrom;" and when phosphorous "exists in crude or pig iron, it is extremely difficult " to remove in the after processes" employed, to convert it into malleable iron or steel; the object here, and which has reference to this subject is, to remove from these ores the phosphorous compounds "that are soluble in acid prior to the smelting thereof." For this purpose the ore calcined or otherwise and broken up or stamped or crushed is agitated by steam or otherwise in "vessels " or tanks, into which is also put as much dilute muriatic or " other acid as will be necessary to dissolve or take up the phos" phate of lime or other combined phosphorous;" "after a lapse " of one or more days," the liquor, when the ore has subsided, is drawn off and the ore washed, and any acid remaining "neutralized " if desired by the addition of an alkali or alkaline earth." The acid liquor is treated with "powdered lime or other matter capable " of precipitating phosphoric acid, and may be employed as a " manure or for the manufacture of phosphorous, or for other " useful purposes, while the acid liquor first drawn off may be " mixed with a fresh portion of a like acid solution, and be again " employed on other portions of ore." The ore so treated is smelted with desulphurized coal, coke, &c.

[Printed, 4*d*. No Drawings.]

A.D. 1857, November 16.—N° 2876.

RICHARDSON, Thomas.—" An improvement in treating man" ganese ores." This consists "in subjecting black wad and " similar ores of manganese to the action of regulated heat as a " preparatory process so as to lessen, or for the most part remove, " the quantity of water present in such ores." The ore in small pieces is exposed to a temperature which must "never approach a " dull red, as at that temperature the ores part with their oxygen." " The most convenient arrangement for carrying out" this invention, "is similar to that adopted for drying bricks, known as " the" drying flat "on which the pieces of ore are spread to a " *depth of 6 or 8 inches.*" "The workmen turns over the whole " *from time to time*, breaking the large pieces by a flat shovel

" as the drying progresses. This drying flat may be heated by " fuel of any kind or by waste heat from any source," as " a " current of dry warm air, or to the waste heat of steam boilers, " sulphur burners, or that from hot water or steam pipe ;" but the first described is preferred.

[Printed, 4*d*. No Drawings.]

A.D. 1857, November 30.—N° 2971.

DEACON, HENRY.—" Improvements in apparatus employed in " the manufacture or production of caustic soda from liquors " obtained in the manufacture of alkali, and applicable also to " the manufacture or production of soap." These are, in apparatus used in boiling such liquids, having an arrangement which prevents their boiling over. This apparatus consists of a tube or tubes extending " a few inches above the level of the liquors in " the vessels," and admitting " of such liquors entering freely " therein at the lower extremity or mouth, so that the boiling or " effervescence takes place over the upper lip of the tube into " the vessel in place of over the sides of such vessel and becoming " thereby wasted."

[Printed, 6*d*. Drawing.]

A.D. 1857, December 4.—N° 3008.

DEACON, HENRY.—(*Provisional protection only*.)—" Improve" ments in the manufacture or production of soda and potash." These are, purifying " the liquors obtained during the manufacture " of soda and potash from the sulphates of those substances," and " the liquors obtained by dissolving the crude potashes of " commerce" by " the application to such liquors of clay or of " substances chemically equivalent to the constituents of clay, " the products thus formed being separated by any convenient " means ;" but, preferring to dilute " such liquors whilst hot " and adding finely powdered lime thereto ;" when the impurities subside the clear liquor is drawn off and employed as above " in the usual manner." The purification may be imperfectly effected by concentrating such liquors, and diluting them whilst hot and adding lime. " And such liquors may also with ad" vantage be partially oxidised during their purification with " clay."

[Printed, 4d. No Drawings.]

A.D. 1857, December 16.—N° 3091.

HILLS, Edwin.—" Improvements in the manufacture of white " lead, and in the working up of the waste materials." These are, according to the claims, " the manufacture of white lead from " ores of lead containing sulphur," the " passing of acetic acid " vapour into the usual white lead stacks for converting the lead " into white lead, whatever may be the process by which the lead " operated upon is obtained," the " burning off the sulphur from " the ores in ovens or retorts so as to obtain sulphur or sulphuric " acid," and the using up the spent tan for making acetic acid " or its salts," " either for white lead making or for market," as follows:—The sulphur ores are roasted in fire-clay or brick retorts, and if sulphuric acid is required passing " as much air " through the ore as is necessary to keep up a good combustion;" but, if sulphur is wanted, the air is shut off " by luting all up " tight." The desulphurized ore is smelted, and the lead is placed " in tan beds, in the usual way of white lead making," passing into the bottom of the stacks a stream of acetic acid, by one or more pipes from a still or boiler, and as hot as possible. When the lead is corroded the stack is taken down, and the tan, " either by itself or with as much more spent tan from the tan " yard " as is " desirable," is distilled " in the same manner as " wood," to obtain acetic acid.

[Printed, 4*d*. No Drawings.]

A.D. 1857, December 18.—N° 3114.

OXLAND, Robert.—(*A communication.*)—" Improvements in " the manufacture of alloys or compounds containing metallic " tungsten." An alloy called " wolfram metal " is made by exposing wolfram ore or mineral to the strong heat of an air or other suitable furnace for about three hours or longer; by preference the ore is placed in crucibles lined with charcoal. The ores should be previously crushed, washed, and, if necessary, calcined or otherwise purified; the mass is finally digested in dilute muriatic acid, so as to remove all arsenic and sulphur. The product is a porous mass of a greyish colour, and consists of metallic tungsten in combination with carburets of iron and manganese.

The wolfram metal may be mixed with iron in the blast furnace, or melted with pig iron in a cupola. About 30 per cent. of the metal may be so mixed with iron.

The alloy of cast iron with tungsten may be used for metallurgical purposes, and for making blue oxide of tungsten and tungstic acid.

The wolfram metal is used for making metallic tungsten and wolframium; it is granulated and digested in muriatic acid, out of contact with air; a black powder is deposited; this is collected on a filter, washed, and dried in currents of hydrogen gas. By triturating the powder in a mortar with water a blue colour is obtained; by digesting it in nitric acid "tungstic acid of a beautiful yellow " colour is produced; by calcination with carbonate of soda tungs-" tate of soda is made."

Good cast steel is obtained by melting ½ to 25 per cent. of wolfram metal with the steel.

Ordinary pots and furnaces may be used; but from 10 to 20 minutes before the metal is poured it should be kept at a bright white heat.

Alloys of iron and wolfram metal may be refined and made into cast steel by cementation in the ordinary way. Refined wolfram cast iron has its crystallization destroyed by being hammered cold.

Pure metallic wolframium, or tungsten, obtained by reducing tungstic acid previously alloyed with nickel, may be used in making German silver or packfong; the ductility is not affected, specific gravity is increased. Two parts of tungsten and three parts of nickel may be fused in crucibles.

[Printed, 4*d*. No Drawings.]

A.D. 1857, December 19.—N° 3121. (* *)

BROOMAN, Richard Archibald.—(*A communication from A. C. Simoneau.*)—" Improvements in lime kilns, and in appara-" tuses employed for working the same." The kiln is of the form of a prolate ellipsoid of revolution, with the ends truncated at different distances from the centre, the larger end being placed upward. The grate is curved upward, and at the front are doors above and below the grate; these doors are approached by a vaulted passage, which expands at its outer end; the lime is conveyed to and from the kiln on carriages, which run on rails; the lime is discharged on a folding grate at the front, down which it falls; one or two extra furnaces are placed at the sides; metal screens are placed at the top of the kiln to ward off currents of air when desired. "The improved apparatuses employed for "working lime kilns, consist of a pronged fork or rake, a lance-"like instrument, a collar or support, which may be adapted to "the discharging aperture, and a leg guard or shield, composed "of rushes or other suitable material, all of which are for the use "of the lime burners in effecting the discharge of the burnt "lime."

[Printed, 10*d*. Drawings.]

A.D. 1857, December 28.—Nº 3171.

DEACON, Henry.—(*Letters Patent void for want of Final Specification.*)—"Improvements in purifying alkaline lees." These are, "in the application and use to and for that purpose of any "of the salts of the magnetic oxide of iron, or of the sesqui-"oxide of iron, or of the oxides of iron obtained from the above-"mentioned salts, or of the sesqui-oxide of iron obtained by "oxidising the protoxide."

[Printed, 4*d*. No Drawings.]

A.D. 1857, December 29.—Nº 3178.

SPENCER, Thomas.—"Improvements in the purification of "illuminating or lighting gas." These are said to be, first, "the "application of the white spathose ore to the purification of illu-"minating gas."

Second, "the application of the magnetic oxide of iron either "in its native or artificial state to the same purposes;" preferring to obtain the oxide directly from the ores afterwards named by treating them as afterwards described.

The "spathose ore" is used in lumps or in a granular state and while moist, in preference in dry lime purifyers. As soon as the ore has become black it is to be removed and a fresh charge substituted.

The black magnetic substance resulting from the calcination of the spathose ore, in preference calcined at a low red heat in ordinary gas retorts, may be used in the same way as above.

Any ore or sand "containing ferruginous matter in a magnetic "state, or any substance not naturally so, but which by treatment "may be reduced to this state, is also available for the said purify-"ing purposes."

"*To render* non-magnetic ferruginous sands and hematite ores "*magnetic*," they are mixed in a tolerably fine state with charcoal or any carbonaceous matter, and not heated above a low red heat in retorts. When these ores so treated are used in fine powder they are mixed with sand or sawdust. When spathose ore is used in the raw state it is mixed with a small proportion of caustic lime to absorb carbonic acid liberated. When any of these substances become saturated with sulphur they are distilled and the sulphur collected and used as ordinary sulphur, and the material in cooling may be used as before.

[Printed, 4*d*. No Drawings.]

A.D. 1857, December 30.—N° 3185.

WARD, Frederick Oldfield.—(*Partly a communication from Frederick Wynants.*)—" Improvements in liberating or producing " potash or soda, or both (as the case may be), from natural " alcaliferous silicates, the residuum of the process being available as a material for manure, puzzolano, or hydraulic cement." These are, first, " the mode of producing or liberating potash or " soda " from the above substances, and " the employment of " fluoride of calcium in conjunction with earthy material or mixture of earthy materials to act with the aid of heat on natural " calcaliferous silicates, so as to produce or liberate potash or " soda" " from potash felspar (orthoclase)," &c., and soda " from soda felspar (albite), potash and soda from pummice and " lava, &c. The substances are all pulverized and mixed, " the " earthy material being in excess of the silicate, and this again in " excess of the fluoride of calcium." " The mixture is fritted " with stirring in a reverberatory furnace.

Second. " The extraction by water of the soluble alcaline " contents of calcined products or frit, obtained when liberating " alcali from alcaliferous silicates, and distinguished by the " double character that it contains, both alcaline matter and fluorine." The ley thus obtained may have silica separated by " passing a current of carbonic acid through " it, " yielding " carbonated alcali."

Third. " The application of insoluble residuum," obtained as above, in " the manufacture of manure, of hydraulic cement, or " of puzzolana at the operator's choice." For manure it is dried and used alone or mixed with phosphatic and nitrogenous ingredients; for cement it is recalcined, and may be ground for puzzolana, in preference burnt clay may be added to it, or the clay may be burnt with it.

[Printed, 4*d*. No Drawings.]

1858.

A.D. 1858, January 6.—N° 21.

JENNINGS, Henry Constantine.—" Improvements in the " production and application of tannin or tannic acid." These are, " the production of tannin or tannic acid from bog peat, and " the application thereof to tanning purposes." Peat of the greatest density, " commonly called deep black bog peat," is selected, and is thoroughly dried by the air and reduced to a coarse powder, and treated with a certain per-centage of nitric acid (depending upon the nature of the peat) well distributed through the mass. In a short time the mass becomes heated, and throws " off orange-coloured fumes in abundance," which are prevented from escaping by covering up the vessel. After the subsidence of the fumes water is added, about six to ten times as much water as acid employed. When completely saturated more water is added, and the whole brought to boil, and the boiling " continued " for four hours or even longer " to extract as much as possible the tanning principle. The peat, before insoluble, has become largely soluble. Peat fresh from the bog is first treated with sulphuric acid and steam from 180° to 212° F. for about two hours before heating it with nitric acid, and proceeding as before. To remove extractive or colouring matter a certain per-centage of chloride of tin is added, and the whole boiled for a few minutes. The liquor is then of a very pale color. Sulphate of alumina and common salt also deposit color. The skins are first steeped in this liquid for many hours and drained, are steeped in a solution of carbonated alkali and again drained, are again introduced to the tanning liquor, and so on, " until the skins are completely " tanned."

[Printed, 4*d*. No Drawings.]

A.D. 1858, January 13.—N° 50.

GREENWELL, George C.—(*Provisional protection only.*)— " *An improved pigment.*" This consists in " the use of that

" iron ore called pisolite in the manufacture of a pigment, the " said ore being calcined and powdered in the ordinary manner."

[Printed, 4*d*. No Drawings.]

A.D. 1858, January 15.—N° 67.

SCHINZ, Charles.—" An apparatus for manufacturing prus-" siate of potash." This consists, first, of the upper part, which is the feeding cylinder, " filled with pieces of charcoal or coke " about the size of wallnuts, with which are mixed some dry pot-" ash and iron filings or oxide of iron ;" the cover is placed on the feeder, and a slide is so moved at the bottom so as to allow the charge to drop into a vertical retort underneath ; nitrogenous gases are admitted by pipes below the retort ; " these gases find " their way to the materials in the retort." A flue or cylinder below the grate of the furnace " holds the matters which descend " into it while they cool, and being air-tight preserves them from " contact with the atmosphere." Ultimately the materials fall into a receiver underneath by means of a slide ; " an equal " quantity of fresh materials is then supplied to the feeder, and " so on." " A modified form " of the above apparatus, " from " which the lower flue and grate are omitted, may be used for the " distillation of the nitrogenous matters." " The diameters of " the feeder, the retort, and the cooling cylinder, being succes-" sively larger, the materials assume a connical form within the " grates, which contributes to a regular inflow and outflow of the " gases." The slides to allow the materials to drop from the different chambers are moved by a hand wheel, a pinion, a rack, and rod. The object of the invention is to prevent the access of air to the materials at any time in conducting the process.

[Printed, 10*d*. Drawing.]

A.D. 1858, January 16.—N° 76.

HILLS, Edwin.—" An improved process for manufacturing sul-" phate of ammonia." This consists " in the direct action of " sulphuric acid gas on any ammoniacal liquor or vapour, as gas " water, stale urine, bone liquor, or any liquid substance or vapour " containing ammonia." " In a common oil of vitriol furnace " or sulphur burner," " sulphur, or sulphur ore," is burned with a " sufficient quantity of nitrous gas and steam," and passed " into a large vat, chamber, or tower lined with lead." " From

" this vat, &c. the " sulphuric acid gas, together with any sulphuric acid formed," is passed " in as divided a state as " possible" into a second vat, &c., into which is also passed the ammoniacal liquor through a pipe terminated with a rose, or by any means, so as it " may come in contact in a finely divided " state," with the acid gas or acid; or the ammoniacal liquor is distilled, and the ammoniacal gas is brought " in a similar way " into contact with the sulphuric acid gas and sulphuric acid." " A small escape pipe is placed on the top of the second vat, " chamber, or tower, to give a draft to the process."

[Printed, 4*d*. No Drawings.]

A.D. 1858, January 23.—N° 124.

DROUET, NICOLAS AUGUSTIN, and LE COQ, PIERRE PHILIPPE.—(*Provisional protection only.*)—" Improvements in " treating chloride of sodium for obtaining therefrom certain " useful products." These are, saturating a solution of chloride of sodium with ammonia and passing oxygen gas through the mixture, " crystallization takes place, and the crystals thus obtained " may serve instead of nitrate of potash for manufacturing gun- " powder or other purposes, or instead of other nitrates." Or nitric acid is added to the solution of chloride of sodium saturated with ammonia, and " finally a current of oxygen gas caused to " pass through it; the crystals obtained may be employed instead " of chlorate of potash or other chlorates for many manufacturing " purposes, such, for instance, as for dyeing and others."

[Printed, 4*d*. No Drawings.]

A.D. 1858, January 30.—N° 174.

BOUCK, JOHN AUGUSTUS.—(*Provisional protection only.*)— " Improvements in the manufacture of sulphate of copper, and in " obtaining certain useful products from such manufacture." These are, " pyrites or other native sulphuret of copper is roasted, " and the sulphur driven off," " may be collected for the vitriol " manufacture or for other purposes," and the required salt is obtained from the residue by treating it with muriatic acid, subsequently adding sulphuric acid, and driving off the muriatic acid by heat. " In place of commencing with the pyrites," taking " the residue from the ordinary vitriol manufacture," and treating *it " with muriatic* and sulphuric acids as above." According to coal or any carbonaceous matter, and not heated above a low red heat in retorts. When these ores so treated are used in fine powder they are mixed with sand or sawdust. When spathose ore is used in the raw state it is mixed with a small proportion of caustic lime to absorb carbonic acid liberated. When any of these substances become saturated with sulphur they are distilled and the sulphur collected and used as ordinary sulphur, and the material in cooling may be used as before.

[Printed, 4*d*. No Drawings.]

A.D. 1857, December 30.—N° 3185.

WARD, Frederick Oldfield.—(*Partly a communication from Frederick Wynants.*)—" Improvements in liberating or producing " potash or soda, or both (as the case may be), from natural " alcaliferous silicates, the residuum of the process being available as a material for manure, puzzolano, or hydraulic cement." These are, first, " the mode of producing or liberating potash or " soda" from the above substances, and " the employment of " fluoride of calcium in conjunction with earthy material or mixture of earthy materials to act with the aid of heat on natural " calcaliferous silicates, so as to produce or liberate potash or " soda" " from potash felspar (orthoclase)," &c., and soda " from soda felspar (albite), potash and soda from pummice and " lava, &c. The substances are all pulverized and mixed, " the " earthy material being in excess of the silicate, and this again in " excess of the fluoride of calcium." " The mixture is fritted " with stirring in a reverberatory furnace.

Second. "The extraction by water of the soluble alcaline " contents of calcined products or frit, obtained when liberating " alcali from alcaliferous silicates, and distinguished by the " double character that it contains, both alcaline matter and fluorine." The ley thus obtained may have silica separated by " passing a current of carbonic acid through" it, " yielding " carbonated alcali."

Third. " The application of insoluble residuum," obtained as above, in " the manufacture of manure, of hydraulic cement, or " of puzzolana at the operator's choice." For manure it is dried and used alone or mixed with phosphatic and nitrogenous ingredients; for cement it is recalcined, and may be ground for

" this vat, &c. the " sulphuric acid gas, together with any sulphuric acid formed," is passed " in as divided a state as " possible " into a second vat, &c., into which is also passed the ammoniacal liquor through a pipe terminated with a rose, or by any means, so as it " may come in contact in a finely divided " state," with the acid gas or acid; or the ammoniacal liquor is distilled, and the ammoniacal gas is brought " in a similar way " into contact with the sulphuric acid gas and sulphuric acid." " A small escape pipe is placed on the top of the second vat, " chamber, or tower, to give a draft to the process."

[Printed, 4*d*. No Drawings.]

A.D. 1858, January 23.—N° 124.

DROUET, NICOLAS AUGUSTIN, and LE COQ, PIERRE PHILIPPE.—(*Provisional protection only.*)—" Improvements in " treating chloride of sodium for obtaining therefrom certain " useful products." These are, saturating a solution of chloride of sodium with ammonia and passing oxygen gas through the mixture, " crystallization takes place, and the crystals thus obtained " may serve instead of nitrate of potash for manufacturing gun- " powder or other purposes, or instead of other nitrates." Or nitric acid is added to the solution of chloride of sodium saturated with ammonia, and " finally a current of oxygen gas caused to " pass through it; the crystals obtained may be employed instead " of chlorate of potash or other chlorates for many manufacturing " purposes, such, for instance, as for dyeing and others."

[Printed, 4*d*. No Drawings.]

A.D. 1858, January 30.—N° 174.

BOUCK, JOHN AUGUSTUS.—(*Provisional protection only.*)— " Improvements in the manufacture of sulphate of copper, and in " obtaining certain useful products from such manufacture." These are, " pyrites or other native sulphuret of copper is roasted, " and the sulphur driven off," " may be collected for the vitriol " manufacture or for other purposes," and the required salt is obtained from the residue by treating it with muriatic acid, subsequently adding sulphuric acid, and driving off the muriatic acid by heat. " In place of commencing with the pyrites," taking " the residue from the ordinary vitriol manufacture," and treating it " with muriatic and sulphuric acids as above." According to this process, a "second quantity of sulphur will be liberated by "the muriatic" which is collected, and metallic copper or salts of copper are obtained "by any usual means."

[Printed, 4*d*. No Drawings.]

A.D. 1858, February 2.—Nº 188.

NEWTON, William Edward.—(*A communication.*)—"Improvements in obtaining certain compounds of nitrogen, to be "applied in the composition of artificial manures and for other "useful purposes." These are, first, "the absorption of compounds of nitrogen with oxygen proceeding from the ordinary "manufacture of sulphuric acid by means of lime or magnesia," or mixtures of the same, "thereby producing nitrates of the alkaline earth employed." The gases after leaving the sulphuric acid chamber, with or without the addition of air, are passed into the bottom of a tower lined with lead and filled with "pieces of "limestone, or of chalk, or of magnesian limestone, or of native "carbonate of magnesia, supported on a perforated false bottom;" water or solution of nitrate of alkaline earth is supplied at the top and trickles down over the surfaces of the material and flows into a suitable reservoir; the upper portion of the tower is connected with a chimney draft. In using caustic lime or magnesia a similar tower is used, but filled "with silicious pebbles or other "suitable material supported on a false bottom," and the gases are passed through in the same way as above, while a mixture is introduced, at the upper part of the tower, of the alkaline earth or earths "with water, the mixture having such a fluidity as will "provide for its flowing readily."

Second. "The application of nitrates of alkaline earths so "obtained in the manufacture of artificial manures, and for other "useful purposes to which such nitrates are applicable."

[Printed, 4*d*. No Drawings.]

A.D. 1858, February 11.—Nº 260.

BURTON, George W.—(*A communication.*)—"An improved "method of manufacturing white lead." This consists in "subjecting the lead and the compounds formed therefrom, by the "agents employed for this purpose, to the action of steam and air, "vapour of acetic acid, and carbonic acid gas alternately and successively *until the process* is complete," and also "the means by

" respectively in vessels containing chloride of sodium and water; " this being done, galvanic action takes place, and the metals in " the ores are conveyed into the vessels containing chloride of " sodium and water. This silver wire will convey silver, copper " wire will convey copper, and so on. The metals thus deposited " may be afterwards reduced or used by any of the methods at " present known. I do not confine myself to the use of chloride " of sodium, as most other salts will produce the galvanic action " as above described."

[Printed, 4*d*. No Drawings.]

A.D. 1858, March 2.—N° 413.

NEWTON, ALFRED VINCENT.—(*A communication from M. le Chatelier.*)—" An improvement in the process of manufacturing " soda and potash." These are, " the application of acids derived " from fluor (fluor spar) by the agency of steam to the manufac- " ture of soda and potash and of various salts which are inter- " mediate or accessory products thereof," " by causing steam to " act at a high temperature (either in reverberatory furnaces or in " retorts, of the form of gas or zinc retorts," &c.) upon " a mixture " of fluate of lime (fluor spar) and silica or siliceous matter." " The hydrofluosilicic acid thus obtained may be collected in " condensing apparatus, such as those employed in the manu- " facture of muriatic acid, or brought into direct contact with the " substances upon which it is to react." Or it may " be concen- " trated by evaporation or distillation."

" Common or sea-salt, either dry or in solution, or in sea-water," is decomposed by hydrofluosilicic acid, hydrochloric acid being in solution and fluosilicate of soda insoluble, and may be separated. " Various products may be extracted from the fluosilicate of soda," as follows:—When it is digested " in the hot state," with sufficient lime to saturate " both the fluor and silicum," a solution of caustic soda is obtained, and " which may be carbonated." The fluosilicate of lime obtained " will serve for the preparation of " hydrofluosilicic acid." By causing fluosilicate of soda " to " digest with sufficient lime to take up the fluor only, silicate of " soda is obtained, and may be used in solution or dried, or it " may be converted into carbonate of soda." The fluoride of calcium may be employed for the production of hydrofluosilicic acid. By " heating at a low temperature the fluosilicate of soda

" in an atmosphere containing steam, the greater part of the hydro-" fluosilicic acid will be driven off, and may be collected by the " processes already mentioned;" "fluoride of sodium will remain, " which may be be converted into soda by means of lime, or made " commercially available for other purposes." "Hydrofluoric " acid may, if required, replace the hydrofluosilicic acid by reason " of the slight solubility of the fluoride of sodium." "The re-" actions above described may be applied to potash." By making the two salts, acetate of soda and hydrofluosilicate of alumina, to react "by means of double decomposition" upon each other, "a " precipitate of fluosilicate of soda will be obtained, leaving an " acetate of alumina in solution."

[Printed, 6*d*. No Drawings.]

A.D. 1858, March 4.—N° 433.

BOULTON, Samuel.—(*Provisional protection only.*)—"Obtain-" ing by an improved method certain products from materials " used in the manufacture or purification of gas." The products, " ammonia, prussiate of potash, prussiate of soda, prussiate of " iron (commonly called Prussian blue), sulphur, and sulphuric " acid," are obtained from any material containing oxide of iron after purifying gas, as follows:—"If the material is mixed " with wood or sawdust, the whole is placed in water to wash " out the same, and the remaining material is in preference " ground, and placed in a solution of carbonate of soda or of " potash, sulphate of soda or of potash, adding thereto a little " lime, if found desirable," but it is preferred to render the soda or potash wholly or partially caustic, and "usually apply heat and " frequent agitation." The ammonia evolved is condensed. "When the whole has been sufficiently operated upon" the solution is allowed to subside; or sometimes an acid, in preference muriatic acid, is added to precipitate sulphur, and if requisite filter and wash the same, and dry and sublime the same, or apply it " in the manufacture of sulphuric acid." The clear solution obtained as above is evaporated and crystallized for prussiate of potash or soda; or a solution of iron, in preference the muriate, is added for the production of Prussian blue, to be disposed of as such, or treated for prussiate of soda or of potash.

Instead of the above, sometimes applying to the original materials *ground or otherwise* either muriatic or sulphuric acid, diluting the same if necessary. The ammonia is in solution, and may be washed off and treated as desired, and the residue treated as above.

[Printed, 4*d.* No Drawings.]

A.D. 1858, March 5.—N° 440.

BARHAM, Alfred Garratt.—(*Provisional protection only.*)—"Improvements in the manufacture of gypsum." These are, "submitting the gypsum in its raw state to the action of high-"pressure steam, or steam surcharged with heat, by which the "water is more readily extracted or absorbed than by the means "at present in use."

[Printed, 4d. No Drawings.]

A.D. 1858, March 9.—N° 476.

DEACON, Henry.—(*Letters Patent void for want of Specification.*)—"Improvements in purifying alkaline lees." These are, "the application and use to and for such purifying purposes of "any material substance containing iron, preferring those substances known as iron ores, the oxides of iron contained therein "being the active agents."

[Printed, 4*d.* No Drawings.]

A.D. 1858, March 12.—N° 507.

CORBELLI, Luigi Ferrari.—(*Partly a communication from Vincent Riatti.*)—"An improved process for extracting aluminium "from its compounds, and obtaining at the same time proto-"chloride of mercury." An electro-depositing solution is made that contains a salt of alumina and either chloride of calcium or chloride of sodium. This liquid is electrolysed with a weak electric current and with a positive pole of mercury and a negative pole of zinc. "A galvanic action being now set up, the salts of "alumina will be decomposed, and the aluminium will be "deposited upon the zinc plate, either in the form of a blackish "powder or in a thin compact sheet. During this operation the "chlorine will be set at liberty, and having a great affinity for "mercury, it will combine with that metal, and form therewith "protochloride of mercury (commonly known in commerce as "calomel), which will be found deposited on the surface of the "mercury at the bottom of the vessel."

[Printed, 4*d.* No Drawings.]

A.D. 1858, March 26.—N° 644.

SCHLŒSING, Jean Jaques Theophile, and ROLLAND, Eugène.—"Improvements in the manufacture of carbonates of "soda." These are said to be rendering the processes for the above manufacture described in No. 1425, 1854, "which previously "were only partially continuous," "wholly so, that is to say, "while a given quantity of chloride of sodium is converted into "carbonate of soda and withdrawn from the converting vessel, a "similar quantity of chloride of sodium is supplied to the vessel, "a corresponding quantity of ammonia is recovered from the "filtered liquid and returned to the vessel, and a corresponding "quantity of bicarbonate of soda is roasted into carbonate, and "the carbonic acid returned to the vessel, as also a further quantity "obtained by roasting limestone." "The converting vessel con-"sists of a series of horizontal cylinders, to which a solution of "chloride of sodium is supplied at one end, and circulates through "them until it escapes at the other end of the series. During its "passage it arrives first at a point where ammonia is supplied to "it, either in a gaseous form, or by preference dissolved in brine; "as it passes in, it next comes in contact with carbonic acid gas "supplied from a lime kiln, and lastly, before its discharge, it "meets with a purer carbonic acid, obtained partly by roasting "the bicarbonate and also by heating the liquid filtered from it." "Within the converting vessel are instruments like paddle-wheels "carrying a series of floats," which agitate the liquid. "The "gases are drawn through the vessel in a direction opposite to "the flow of the liquid by a fan which also maintains a partial "vacuum in the vessel, and so prevents loss of ammonia by "leakage." Before the gases are allowed to escape into the atmosphere "they are caused to pass through a tower containing "coke moistened with water, and this water is used for dissolving "salt."

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1858, April 3.—N° 703.

GREENSHIELDS, Thomas.—(*Provisional protection only.*)—"Improvements in treating 'ammoniacal' liquor produced from "coal in making gas, and obtaining useful products for making "artificial manures." These are, "subjecting the ammoniacal "liquor *to the action of* sulphate of lime reduced to powder;"

In the course of "three or four hours" "the carbonate of ammo-" nia becomes a sulphate of ammonia," containing hydrosulphuret and other impurities; to decompose the sulphuret, sulphuric acid is cautiously added, the clear liquor run off and evaporated with slight additions of sulphate of lime, and again run off and crystallized. In some cases, "sawdust, fine ashes, or spent tan " reduced to powder" is added, and "the mixture evaporated to " dryness." In some cases the concentrated solution of sulphate is mixed with an equivalent of common salt "to form a sulphate of " soda and muriate of ammonia," and "either separate the salts " by well known means or evaporate the liquid to a combined " salt, either with or without the addition of sawdust," &c. " When it is desired to make a muriate of ammonia and sulphate " of soda, the sulphate of soda to be used for making a carbonate " of soda," add to the clear liquor run off from the first pan " the equivalent of common salt, and concentrate the liquor, and " remove the crystals of sulphate of soda as they form." "The " impurities in the sulphate of soda will be removed in converting " the sulphate into carbonate of soda by well known means." Manure is also made by mixing the residue in the process with other matters.

[Printed, *4d.* No Drawings.]

A.D. 1858, April 10.—N° 783.

MANBRÉ, ALEXANDRE.—"The manufacture of a colouring " matter for colouring spirits, beverages, and other liquids from " the sugar of potatoes, known as glucose and syrup 'de fecule.'" Among the liquids named is vinegar. Two preparations are made, the first for spirits &c. under proof, the second for spirits &c. above proof. The first is made by heating glucose over a naked fire "until it has lost all its sweetness or flavor of sugar," at the same time "all the floating part containing the froth and " other impurities should be taken out." "If the colouring is " wanted solid" it should now be taken out of the vessel, if otherwise water is added by "pouring it all round the vessel but not in " the middle, to avoid any explosion, and boil it afterwards as " usual." "If instead of taking out the froth as above stated one " pound of alum or soda for every hundredweight of glucose be " added, together with the water, the coloring will be of a " superior quality."

"The second is obtained in proceeding as the first," only "putting into the vessel together with the glucose two pounds of "potash for every hundredweight of glucose, and also two pounds "of alum or soda to be put in at the same time with the water."

[Printed, 4*d*. No Drawings.]

A.D. 1858, April 16.—N° 828.

PRICE, Astley Paston.—"Improvements in the treatment of "certain zinc ores and compounds of zinc, and in the manufacture "of zinc and oxide of zinc." These are, "the treatment of calcined or oxidized ores," prepared oxides, and "substances and "products containing artificially prepared oxides of zinc and "metallic zinc, when in a state of minute division," first, by mixing them with two parts in bulk of bituminous coal to one of the metallic substance and submitting the mixture to a coking process, "but these proportions vary with the quality of the coal." "Bituminous or tarry or pitchy matters are employed" in place of bituminous coal, the object being to obtain what is termed "a "coke or coked material."

Second, employing and treating these "cokes or coked "materials" either "alone or in conjunction with other fuel, "fluxes, or adjuncts in a cupola, blast, or other suitable smelting, "reducing, or distilling furnaces," for the purposes of obtaining "zinc and oxide of zinc."

Third, employing and treating these "cokes or coked materials" for the manufacture of zinc in the distillatory apparatus "now "generally adopted, or capable of being applied to the distillation "of zinc."

[Printed, 4*d*. No Drawings.]

A.D. 1858, April 16.—N° 829.

PRICE, Astley Paston.—"Improvements in obtaining cad-"mium and certain compounds thereof." Ores containing cadmium, as blendes, or sulphurets of zinc containing sulphurets of cadmium, are calcined in a suitable furnace in contact with air. The sulphuret is "entirely or in part converted into sulphate of "cadmium, the other metals into sulphates or oxides." The sulphate of cadmium may be "dissolved out by means of water or "otherwise." Cadmium is "separated therefrom by means of "metallic zinc," or sulphuretted hydrogen or other precipitating agents. If the solution contain silver or iron they may be previously precipitated by means of metallic iron. Sulphurets of zinc or blendes are subjected to "the salting process," by calcining them with salt or chloride of sodium, or other suitable chloride. The resulting soluble salt of cadmium is washed out with water, and cadmium is separated therefrom.

The sulphuret of cadmium, obtained as aforesaid may be dissolved in hydrochloric or nitric acid, and the cadmium is then precipitated by means of zinc, or otherwise.

The sulphuret of cadmium may be calcined and "converted into " oxide, and this being mixed with suitable carbonaceous " matters "is distilled in suitable vessels."

[Printed, 4*d*. No Drawings.]

A.D. 1858, April 23.—N° 895.

GREENSHIELDS, THOMAS.—"Improvements in purifying gas " produced from coal, and obtaining ammoniacal and other alka- " line salts." These are, first, in the use of a "solution formed " by mixing a solution of chloride of sodium, a solution of sul- " phate soda, and a solution of an hydrated alkaline metallic " oxyde (caustic alkali), and using the solution thus made in a " 'scrubber' or 'scrubbers,' or absorbed into porous material, " and used in a 'dry' or similar description of purifyers, for " removing ammonia, sulphur, and carbonic acid from gas."

Second, "in the use of a solution of sulphate of soda, and a " solution of an hydrated alkaline metallic oxyde (caustic alkali), " the solution to be used separately in separate 'scrubbers,' or " separately absorbed into porous material, and used in separate " 'dry' or similar description of purifyers, or to be used by " mixing the two solutions into one solution, and used in a " 'scrubber' or scrubbers, or absorbed into porous material, and " used in 'dry' or similar description of purifyers, for depriving " gas of ammonia, sulphur, and carbonic acid."

Third, in the use of sulphate of soda solution in combination with the process or processes herein-before described for manufacturing from the products obtained from the purification, muriate of ammonia, carbonate of soda, and recovering the sulphate of soda used, to be used again.

Fourth, in the use of a caustic alkali in combination with the process or processes before described, for removing from gas sulphur and carbonic acid, and for obtaining the sulphur, or for manufacturing sulphuric acid, and recovering the alkali, to be used again for removing sulphur and carbonic acid from gas.

[Printed, 4*d*. No Drawings.]

A.D. 1858, April 23.—N° 901.

JENKIN, ALFRED.—"Improvements in furnaces for the reduc-" tion and calcination of lead, tin, and copper ores." These are, in reference to this subject, "for the purpose of condensing in an " economical manner the vapours of oxide of lead, which are " thrown off in large quantities from the flowing furnace, and are " frequently wasted by passing up the chimney." It is proposed " to employ a cistern containing water, which is placed imme-" diately beneath the cast-iron bottom of the calcining furnace. A " portion of the heat and vapours from the flowing furnace are " made to pass directly over the water in the cistern, the steam " from which effects the required condensation of the oxide. A " main flue constructed at the end of the calcining furnace " receives the heat and products of combustion from such furnace " and from the main flue leading from the flowing furnace, whence " they pass off direct to the chimney." In relation to furnaces, the general construction, arrangement, and combination of parts are claimed, as also the application and use in calcining furnaces of cast iron or other metal bottoms heated by the waste heat of an adjoining flowing furnace or furnaces, the arrangement of flues, and the lowering the centre portions of the roof of both the flowing and calcining furnace.

[Printed, 10*d*. Drawing.]

A.D. 1858, April 27.—N° 929.

FRASER, JOHN.—"Improvements in the manufacture of nitrate " of potass." These are, first, dissolve "one ton of muriate of " potass of not less than 90°/₀" in water, allow it to subside and add 22½ cwts. commercial nitric acid, and apply heat and condense the hydrochloric acid "in the usual way." The residue is put into vessels to crystallize.

Second, dissolving the ordinary nitrate of potash "produced " in the East Indies or other country" in water, and "adding " nitric acid according to the refraction, boiling and crystallizing

" in the usual way; say, for instance, at 3½°/₀ refraction, about " 3½ pounds nitric acid to the cwt."

[Printed, 4d. No Drawings.]

A.D. 1858, May 3.—N° 987.

CLARK, WILLIAM.—(*A communication from Alphonse Anthelme Antoine de Rostaing.*)—" Improvements in separating and in " otherwise treating matters in a state of fusion, and in apparatus " for the same." These are, first, " the application of centrifugal force to the mechanical subdivision continuously of solids " liquefied, for the purpose of dividing simply and mechanically " the matters, to assist the chemical actions which operate and " are more effective on matters in a subdivided state."

Second, " the apparatus composed of an axis of rotation, and of " a receiving disc for the matters." " The strength and size of " these two parts are variable, and depend on the quantity and " weight of liquefied matter to be subdivided, and to the speed " of rotation to which they are to be submitted, &c."

Third, " the direct application of the process " to " the decarburetting of iron." " When applied to this purpose and in " order to bring the flow of iron from the blast furnace as near as " possible, the basin is composed of two cylinders of cast or " sheet iron, &c. placed concentrically and connected by a bottom. " The smaller or interior cylinder is bottomless, and the shaft of " the separator passes through the space of this cylinder." " The " cast iron is projected and separated by centrifugal force."

Fourth, " the direct application of this force of subdivision to " lead in the formation of oxides and salts employed in commerce." The lead in a fine state of division and dry or slighty damp is submitted " to a heat equal to oxydizing without melting " it." The oxide formed is removed and the residue treated as before. Lead in a similar state and in similar manner is submitted to the action of vapours of acetic acid. Carbonate of lead is formed.

[Printed, 6d. No Drawings.]

A.D. 1858, May 6.—N° 1013.

NEWTON, WILLIAM EDWARD.—(*A communication.*)—" Improvements in the manufacture of saltpetre." These are, " potash, is first rendered caustic by treating it with about its own

" weight of newly slacked lime," and " at least ten times its weight " of water," and boiling it in a close vessel until a small portion of the clear or filtered liquid " is no longer acted upon by lime " water." The potash lye is allowed to settle, and is decanted into a second closed vessel or boiler containing an equivalent quantity of a solution of nitrate of soda. " The contents of this " second vessel, after the desired chemical change has taken " place, must be evaporated so as to obtain the greater portion of " the saltpetre, which is crystallized out of the solution by cooling in a closed crystallizing vessel to which the boiling liquid " is supplied by means of a cock or valve adapted to the second " boiler." The mother liquor is evaporated and again crystallized, and the solid matter drained out of " the atmosphere, and " may be a second time crystallized." The liquid remaining is a strong solution of caustic soda, which may be evaporated. The arrangement of the apparatus employed is claimed.

[Printed, 8*d*. Drawing.]

A.D. 1858, May 17.—Nº 1094.

ALLEN, JOHN, and ALLEN, WILLIAM.—" Improvements in " the treatment of iron and copper pyrites, and in apparatus for " the same." These are, first, " the application of atmospheric " air by means of a downward draught (instead of an upward as " usual) to the mass of iron or copper pyrites under treatment " for the manufacture of sulphuric acid." The lower part of the ordinary pyrites kiln is connected with the ordinary leaden chamber, which is connected as usual with a chimney to secure the usual draught.

Second. " The application of a downward draught within and " through a cupola or other similar vertical furnace, for the purpose of smelting the burned residuum of pyrites containing " copper." The lower part of a cupola open at top is connected with a " flue leading to a chimney with a powerful draught." " The slag and regulus will pass down through the fuel " to the bottom of the furnace, " and may be tapped off when con- " venient."

Third. " The combination of a reverberatory furnace with a " kiln, so as to form or constitute a furnace adapted for the " decomposition of iron or copper pyrites mixed with common " salt, when worked *up* into balls, bricks, or lumps, or other

" convenient shapes;" such " decomposing furnace being so " arranged that the waste heat from the reverberatory furnace " shall pass up through the mass of balls, &c., in the kiln, and " that the mass of balls, &c., shall pass from the kiln to the " reverberatory furnace to be finished." Upon the end of a reverberatory furnace furthest from the fire is the kiln, with the lower part open to the furnace; from the top of the kiln is a draught flue to the chimney.

[Printed, 8*d*. Drawing.]

A.D. 1858, May 17.—N° 1103.

IMEARY, Robert, and RICHARDSON, Thomas.—" Im-" provements in roasting small or disintegrated pyrites." These are, using or applying " of several flats in the same furnace, or of " several separate furnaces, so worked together as to secure a " regular supply of sulphurous acid," and " by such treatment " the residuum in some cases is rendered commercially useful." " The small pyrites resulting from the disintegration of the large " ore as it is raised in Spain," or " the bisulphuret of iron which " is now separated from the coal brasses by grinding and wash-" ings," or " the small pyrites which is produced by the action of " the atmosphere in the Cleveland and other districts," are selected and are exposed as above " to a low heat, so regulated " as never to exceed a dull redness." The furnace is " of the " ordinary reverberatory construction, and consists of five or six " flats or divisions, either on one level or raised about three or " four inches above each other." When several furnaces are employed " the charge in each furnace remains there till it is " completed, whereas, when a succession of flats is used, the " charge is moved from flat to flat," " from a higher to a lower " flat and nearer the fire, by which means the partial desul-" phurized ore is exposed to a higher temperature in proportion " as it loses its sulphur." " At the end of the furnaces a narrow " division is appropriated " for the nitre cups to supply nitrous gases for making sulphuric acid. " When the desulphurization " is complete, the residuum is treated with water to dissolve out " the sulphate of copper which will have been formed ; " the oxide of iron left " is available in some cases for the manufacture of " *Venetian* red and Spanish brown."

[Printed, 4d. No Drawings.]

A.D. 1858, May 18.—N° 1107.

CROLL, Alexander Angus.—" Improvements in the treat-" ment of sulphate of alumina, and in obtaining alum." These are, first, " preparing uncrystallized sulphate of alumina," by employing " as small a quantity of acid (oil of vitriol) as possible," and neutralizing any remaining free acid, as well as decomposing " any salt of iron which it may contain, by adding to the pre-" paration soda or potash in an alkaline state," in preference, " in proportion equal to one-fifth of the resulting quantity " obtained."

Second. " Substituting for the sulphate of ammonia, or " potash " in alum making, sulphate of soda as being less costly," in " place of the quantity of sulphate of ammonia or potash " usually employed," using " a proportion of sulphate of soda " equal to about one-fifth part of such quantity, adding thereto " four-fifths or thereabouts of sulphate of ammonia or potash " to make up that quantity."

[Printed, 4*d*. No Drawings.]

A.D. 1858, May 22.—N° 1149.

PRICE, Astley Paston.—" Improvements in the treatment of " certain zinc ores and compounds of zinc, and in the manu-" facture of zinc and oxide of zinc." These are, first, treating of " zinc ores, after having been submitted to a process of calci-" nation or oxidation," first, by mixing them " by preference in " a fine of state of division with bituminous coal, or with coal or " carbonaceous matter and bituminous coal, or with coal or car-" bonaceous matter and pitch, tar, asphalte, or bitumen," &c., or mixtures of the same, and submitting the same to pressure with or without heat. The materials after compression may be subjected to a heating, distillatory, or to a coking process, so as " a " coked or partially coked material may be obtained," or the pressed material may be directly employed for the purposes hereinafter mentioned.

Second. Mixing " suitable fluxes with the before mentioned " ores of zinc, together with the carbonaceous matters, and treating them as above.

Third. Employing, " if necessary, with the addition of fuel, of " all such pressed or pressed and partially coked or carbonized

" materials, either combined with suitable fluxes, for the distilla-" tion of zinc, either in the distilling pots or in the distillatory " apparatus generally employed or capable of being employed " for such distillation, and for the smelting or distillation and " obtaining of zinc or of oxide of zinc, in any suitably arranged " blast, cupola, or other similar furnace."

[Printed, *4d.* No Drawings.]

A.D. 1858, June 3.—N° 1247.

BETHELL, John.—" Improvements in the manufacture of " alum." These are, in "a mode of getting ammonia from " gas for the purpose of making alum, and in useing the liquid " sulphate of ammonia obtained from gas," for making alum Weak sulphuric acid is placed in a close tank or purifier, and the gas is passed through it until saturated with ammonia; "this " liquid sulphate of ammonia" is then added to a solution of sulphate of alumina, and the whole is evaporated, and alum crystallized out "in the usual way." Small pieces of coke or sawdust, or other substances, moistened with the above acid, may be put into the close tank or purifyer, and when the acid is saturated with ammonia the coke, &c. is washed with water for the sulphate of ammonia, and "proceed to make alum as above " described." The process is disclaimed "as a purifying process " for gas."

[Printed, *4d.* No Drawings.]

A.D. 1858, June 5.—N° 1271.

MANBRÉ, Alexandre.—" An improved method of preparing " malt and other grain, and in extracting the saccharine matter " therefrom, whether for the purposes of brewing, distilling, or " otherwise." This consists, first, " separating the bran or husk " from the grain by grinding or otherwise."

Second. " Extracting the saccharine matter from the flour" as follows:—A vessel of any capacity containing water is heated by a naked fire, the water is gradually heated up from 50° to 100° F., the grain in a state of flour is gradually added with stirring, the heat being applied until the temperature is about 180° F. "If " beer or ale is to be produced," hops are added, and "after " thorough admixture the whole is allowed to settle, when infu-" sion and maceration only are required." When deemed requisite the whole is boiled for an hour, "allowed to settle for from "1½ to 2½ hours," drawn off and boiled; "hops are again added "if necessary," the liquor is drawn off into coolers, and used as required. "The boiling may be effected without drawing off the "liquid." "Another method of extracting saccharine matter "from grain in flour" is employing a vessel capable of being hermetically closed and furnished with a perforated false bottom on which is placed wire gauze and a layer or layers of felt, &c.; the grain, &c. is placed on the felt, and water from 50° to 100° F. is admitted through a cock to moisten the materials, when water at 175° to 185° F. is admitted, and after standing some time air or steam or other agent is forced in over the mass, "the liquid "is forced through the filter, and is drawn off and used for the "manufacture of beer, spirit, vinegar, sugar, &c." A pump or vacuum may be employed to draw it through the filter in place of air, &c.

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 7.—N° 1283.

LOMBARD, Jean Baptiste Adolphe, and ESQUIRON, Xavier Tristan.—"A new or improved method of obtaining "saccharine substances from cereal and vegetable matters, and "applying the products obtained to various useful purposes." These are, first, "a new mode of effecting the graduated or pro-"gressive saccharification of all cereals," vegetable matters, such as ligneous fibres, roots, and feculous fruits in general, "by means "of the simultaneous use of water, weakly acidulated or not, "and of apparatus having closed boilers heated either by a cur-"rent of superheated steam or by an open fire, or by the intro-"duction into these apparatus of air or any other gaseous body "compressed, which delays the arrival at the boiling point, the "effect of which is the capability of raising the temperature of "the mixture contained in the apparatus," which is effected "either by a bath of fatty bodies, metal in fusion," &c.

Second. "The application of all kinds of mineral or vegetable "acids, and, by preference, oxalic, sulphuric, and hydrochloric "acids, &c.," their application being to avoid too high a temperature and avoid "caramilisation of part of the saccharine "matter."

Third. "The application of the product obtained (wort) to the " manufacture of all kinds of beer or beverages."

Fourth. "The application of these processes to the manufacture " of syrups, and to the application of these latter to the distilla- " tion and manufacture of vinegars."

[Printed, 8*d*. Drawing.]

A.D. 1858, June 17.—N° 1376.

CROCKFORD, Charles.—(*Provisional protection only.*)—" Im- " provements in the treatment of the ores of zinc, and in spelter " making." These are, first, "utilizing the sulphur contained " in the sulphuret of zinc" as follows:—" The sulphuret of zinc " is introduced continually in small quantities at one end of a " chamber, the floor of which is heated by a fire and flues under- " neath, and exposed in its passage from one end to the other of " the said chamber to the action of a current of heated air, by " which the sulphur is converted into sulphurous acid," which " may be applied to the manufacture of sulphuric acid," &c.

Second. "Treating the carbonate of zinc for the purpose of " obtaining carbonic acid and other products therefrom," as follows:—Adding to these ores sulphuric or muriatic acid; the carbonic acid evolved collected, and the sulphate and muriate of zinc are also collected.

Third. Obtaining products (the muriate of zinc in solution or otherwise) "by the application of acids either in vapour or liquid, " to the fumes passing through the flues of the retort furnaces " used in spelter making."

Fourth. " Treating the residue (a mixture of the oxides of zinc " and iron) left in the retorts after the process" of spelter making, as follows:—Mixing the residue with a small quantity of clay or lime, or both, and submitting the mixture "to the action " of a blast in a small cupola or blast furnace, the vent of which " is conducted into water." By this means "the oxide of iron " will be reduced, and may be drawn off by a tap hole of the " furnace, and the oxide of zinc will be carried forward into the " cistern," and "may be collected for use."

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 19.—N° 1382.*

SPILSBURY, Francis Gybbon.—(*Provisional protection only.*) —" *Making* tungstic acid & certain of its salts, and for using the

" same to decolor acetic acid & its compounds." This consists, first, in taking wolfram, or ore of tin containing wolfram, & mixing it " with bisulphate of soda or potash, or with a mixture of " sulphate of soda or potash and sulphuric acid, or with a mix- " ture of muriate of soda or potash and sulphuric acid, and " subject the same to a red heat until the wolfram is separated " into tungstic acid and sulphates of iron and manganese."

Second. " Boiling a solution of colored acetate of lime or lead " with tungstic acid;" the color goes down with the tungstate of lime or lead, and " acetic acid is left in solution." Then combining " the acetic acid with oxide of lead or barytes," and precipitating with tungstate of soda, obtaining " tungstate of lead or " barytes and pure acetate of soda."

Third. Preparing " tungstate of soda or potash by boiling wol- " fram, or tin ores containing wolfram, under pressure in solu- " tions of caustic soda or potash."

Fourth. Decoloring " acetate of lime or lead by adding tung- " state of soda to their respective solutions."

Fifth. Obtaining " tungstate of lead, barytes, strontian, or lime, " by boiling their respective sulphates or carbonates with or " without pressure in a solution of tungstate of soda or potash, " or by heating in a furnace either of the above sulphates or car- " bonates, previously ground with dry tungstate of soda or potash, " or dry tungstic acid."

[Printed, *4d.* No Drawings.]

A.D. 1858, June 21.—N° 1404.

DEACON, Henry. — " Improvements in purifying alkaline " lees." These are, first, " adding at any convenient tempera- " ture not exceeding 130° F." (a temperature of 70° to 80° is usually a convenient heat, and about 45° Twaddell a convenient strength), hydrated protoxide, peroxide, or magnetic oxide of iron, hydrated sesquioxide of iron preferred, to alkaline lees " in- " order to decompose the alkaline sulphides existing in such " lees."

Second. " Separating at any lower temperature than 130° F., " the precipitate of metallic sulphides produced in and from such " lees by the reaction at a higher temperature of any salt or " oxide of iron when added thereto." Employing " heat only

Third. "The application of the product obtained (wort) to the "manufacture of all kinds of beer or beverages."

Fourth. "The application of these processes to the manufacture "of syrups, and to the application of these latter to the distillation and manufacture of vinegars."

[Printed, 8*d*. Drawing.]

A.D. 1858, June 17.—N° 1376.

CROCKFORD, CHARLES.—(*Provisional protection only.*)—"Im-"provements in the treatment of the ores of zinc, and in spelter "making." These are, first, "utilizing the sulphur contained "in the sulphuret of zinc" as follows:—"The sulphuret of zinc "is introduced continually in small quantities at one end of a "chamber, the floor of which is heated by a fire and flues under-"neath, and exposed in its passage from one end to the other of "the said chamber to the action of a current of heated air, by "which the sulphur is converted into sulphurous acid," which "may be applied to the manufacture of sulphuric acid," &c.

Second. "Treating the carbonate of zinc for the purpose of "obtaining carbonic acid and other products therefrom," as follows:—Adding to these ores sulphuric or muriatic acid; the carbonic acid evolved collected, and the sulphate and muriate of zinc are also collected.

Third. Obtaining products (the muriate of zinc in solution or otherwise) "by the application of acids either in vapour or liquid, "to the fumes passing through the flues of the retort furnaces "used in spelter making."

Fourth. "Treating the residue (a mixture of the oxides of zinc "and iron) left in the retorts after the process" of spelter making, as follows:—Mixing the residue with a small quantity of clay or lime, or both, and submitting the mixture "to the action "of a blast in a small cupola or blast furnace, the vent of which "is conducted into water." By this means "the oxide of iron "will be reduced, and may be drawn off by a tap hole of the "furnace, and the oxide of zinc will be carried forward into the "cistern," and "may be collected for use."

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 19.—N° 1382.

***SPILSBURY*, FRANCIS GYBBON.**—(*Provisional protection only.*) —"*Making* tungstic acid & certain of its salts, and for using the "same to decolor acetic acid & its compounds." This consists, first, in taking wolfram, or ore of tin containing wolfram, & mixing it "with bisulphate of soda or potash, or with a mixture of "sulphate of soda or potash and sulphuric acid, or with a mixture of muriate of soda or potash and sulphuric acid, and "subject the same to a red heat until the wolfram is separated "into tungstic acid and sulphates of iron and manganese."

Second. "Boiling a solution of colored acetate of lime or lead "with tungstic acid;" the color goes down with the tungstate of lime or lead, and "acetic acid is left in solution." Then combining "the acetic acid with oxide of lead or barytes," and precipitating with tungstate of soda, obtaining "tungstate of lead or "barytes and pure acetate of soda."

Third. Preparing "tungstate of soda or potash by boiling wolfram, or tin ores containing wolfram, under pressure in solutions of caustic soda or potash."

Fourth. Decoloring "acetate of lime or lead by adding tungstate of soda to their respective solutions."

Fifth. Obtaining "tungstate of lead, barytes, strontian, or lime, "by boiling their respective sulphates or carbonates with or "without pressure in a solution of tungstate of soda or potash, "or by heating in a furnace either of the above sulphates or carbonates, previously ground with dry tungstate of soda or potash, "or dry tungstic acid."

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 21.—N° 1404.

DEACON, Henry.—"Improvements in purifying alkaline "lees." These are, first, "adding at any convenient temperature not exceeding 130° F." (a temperature of 70° to 80° is usually a convenient heat, and about 45° Twaddell a convenient strength), hydrated protoxide, peroxide, or magnetic oxide of iron, hydrated sesquioxide of iron preferred, to alkaline lees "in "order to decompose the alkaline sulphides existing in such "lees."

Second. "Separating at any lower temperature than 130° F., "the precipitate of metallic sulphides produced in and from such "lees by the reaction at a higher temperature of any salt or "oxide of iron when added thereto." Employing "heat only "when it is desirable to hasten the reaction of oxides or salts, "which in the cold may from some cause be acted upon with "difficulty."

Third. "Adding any salt of iron or oxide of iron to such lees "in a state of concentration at or near their boiling points, and "in subsequently diluting them and separating the precipitate." Preferring to employ this process "when it is necessary to use the "anhydrous metallic oxides and insoluble metallic salts."

Fourth. "Submitting a mixture of alkaline lees and any salt "of iron, manganese, or zinc to agitation," "until the reaction is "complete, and the metallic sulphides are produced," separating the sulphides, and again agitating "the lees, but in contact with "atmospheric air." Exposing alkaline lees and any salt as above, "to the combined action of atmospheric air and agita-"tion." The agitation should "at least equal" that "found requi-"site to obtain butter from milk." The air is forced through the hot lees by a modification of the invention described in No. 9569, 1842, "until no discoloration is produced by the "addition of a salt of lead to a portion of the lees."

Fifth. "The prolonged application of a temperature below "130° F. to alkaline lees, when containing any ferro or ferri "cyanides of the alkaline earths or metals;" "a precipitate "containing iron and sulphur is formed." The time "varies "from 24 hours to a week or more."

Sixth. "In the admixture of caustic lime or magnesia to the "precipitate produced by any herein-before mentioned metallic "salt or oxide reacting on such lees, for the purpose of retarding "the oxidation of the precipitate during the separation of the "alkaline lees therefrom." "In practice an equivalent of mag-"nesia or lime to an equivalent of metallic sulphide will be found "sufficient for such purpose," which is added after the sulphides are precipitated.

Seventh. "Roasting such precipitate when not mixed with "lime or magnesia with an alkaline chloride so as to produce a "corresponding alkaline sulphate, with the view of utilizing such "precipitate." "The anhydrous metallic oxides thus obtained "may be again used for purifying other lees," as before described, "until the gradual accumulation of impurities unfit the "oxides for further service."

[Printed, 4d. No Drawings.]

A.D. 1858, June 22.—Nº 1411.

BROWN, Peter, and YOUNG, Benjamin.—" Improvements " in the manufacture of white lead." There are, treating the nitrate of lead however obtained as follows:—The solution of the nitrate is "submitted to the action of streams of carbonic acid gas " obtained by preference from the calcination of chalk or car- " bonate of lime in a closed vessel or retort" or by "the chemical " decomposition of any other cheap and suitable carbonate," until "the solution has become saturated with carbonic acid;" to this saturated solution caustic soda in preference is added in excess. The supernatant liquid is run from the precipitated carbonate of lead, which is "subjected to lixiviation in a strong " solution of lime assisted by the action of a stirrer;" the lime water is then drawn off and "the precipitate which is the pure " white lead of commerce is dried."

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 23.—Nº 1415.

SPENCER, Thomas.—"Improvements in the treatment of iron " ores, and ferruginous sands, and certain applications arising " therefrom." These are, preparing "ferroso-ferric carbide," or " magnetic carbide of iron," or simply magnetic carbide in preference from the ores known as "chalybite or spathose ores, and " also those equally well known as hematite ores or specular iron " ore." The ores ground, and if carbonic acid is present deprived of it by heat, are mixed in preference with granulated charcoal, sawdust, or granulated coke, and heated in a retort to "a dull " or cherry red heat" and "kept at this temperature from two " to six hours, this difference of time depending on the original " state of granulation of the ore." "The newly formed compound " may either be suffered to cool before removing the door of the " retort for the admission of air, or it may be discharged into " water whilst red hot." This compound is employed as a filtering medium for water from which it removes colour, &c. "The " powers of the new substance may be indefinitely sustained with " slight trouble, though constantly in use," by "leaving it " uncovered with water for a few minutes of each day." The substance is used in purifying saccharine and alcoholic liquids, gas, and air, and in the manufacture of iron and steel.

[Printed, 6*d*. No Drawings.]

A.D. 1858, July 3.—N° 1505.

HAEFFELY, Edward.—" Improvements in recovering oxides of " manganese from products arising out of the manufacture of " chlorine, and in raising commercial manganese to higher " oxides." These are, the liquor from the chlorine stills is allowed to flow upon limestone, carbonate of lime or of baryta, until the free acid in it is "neutralized or nearly so;" it is then boiled with finely divided limestone, chalk, or carbonate of baryta, the peroxide of iron suspended is separated, and to the solution " for every equivalent of manganese there should be two of caustic " lime" added. "The precipitate is then boiled and thrown on " to a filter," washed, and dried, and " maintained at a low red " heat, but even a white heat is found not to be injurious," in " a " closed or muffle oven." " The contents of the oven are then " lixiviated with weak hydrochloric acid or by the refuse liquor" from the chlorine stills, " by which treatment the lime is removed " in solution, and the manganese in a high state of oxidation " remains." " In raising manganese of commerce to higher " oxides," proceeding " in the manner above described."

[Printed, 4*d*. No Drawings.]

A.D. 1858, July 28.—N° 1702.

GILBEE, William Armand.—(*A communication.*)—" Improve- " ments in the preparation of hydrated oxide of chromium." These are, manufacturing, " on a large scale, of hydrated oxide of " chromium decomposable at a temperature approximating to red " heat, and of a fine and fast color, and applicable to all the pur- " poses for which mineral colors are usually employed," as follows:—Heating " on the sole plate or bed of a reverberatory " furnace" a mixture of " one part of bichromate of potass and " three parts of refined boracic acid" made into a thick paste with water, not exceeding a dull red heat, and while red hot throwing the mass into cold water and washing with hot water to remove from the oxide " the borate of potass which has been formed." " By evaporating the waters used in washing and adding muriatic " acid, the boracic acid will be recovered, and can be re-employed " in great part. The chloride of potassium resulting from the " preceeding operation forms an article of commerce."

Another process is to " replace in the first preparation the bi- " chromate of potass by an equal quantity of chromate of soda,

" obtained by dissolving in boiling water 61 parts of neutral " chromate of potass and 53 parts of nitrate of soda, using the " boracic acid as before described." " The neutral chromate of " potass in this latter case may be replaced by a mixture of 92 " parts of bichromate of potass and 89 parts of crystallized car- " bonate of soda, the same quantity of nitrate of soda being em- " ployed." In both cases nitre crystallizes out, which may be sold, and the chromate of soda may be crystallized from the mother liquor, or the liquor may be evaporated to dryness and used; the wash waters contain borax. This green is of a lighter tint, and still lighter tints may be obtained by adding alumina, magnesia, or sulphate of baryta. Chromate of lime may replace the above chromates.

[Printed, 4*d*. No Drawings.]

A.D. 1858, August 5.—N° 1783.

McCRUMMEN, Donald.—" Improvements in the manufacture " or production of paper, which improvements are also applicable " in the production of alkaline and other salts." These are as follows, the " plants, whether marine or otherwise, are primarily " cut into short lengths, or into slices, and such as are of a firm " or solid texture are crushed or bruised " and " repeatedly " washed in or exposed to the action of boiling water, with or " without the aid of steam, hydrostatic, or other pressure," until " completely divested of saline ingredients or properties." The " insoluble residuum is then boiled or otherwise treated with " caustic soda, or a mixture of soda and lime, or with a mineral " acid varying in strength according to the texture of the mass, " for the purpose of completely disintegrating and softening the " fibres." The mass is then washed and dried and is fit "to be " employed," separately or mixed, for the manufacture of paper, mill-board, and papier maché, and " such portions of the mass " as may be deficient in fibre may be profitably employed in the " production of portable manure, or for other purposes." " The " fluids used in the different washings " are " evaporated to dry- " ness, leaving the different salts fit for the market, and for the " operations of the manufacturing chemist."

[Printed, 4*d*. No Drawings.]

A.D. 1858, August 10.—Nº 1819.

HENRY, Michael.—(*A communication.*)—(*Provisional protection only.*)—"Improvements in the manufacture or production of "saltpetre, and the preparation of materials for the purpose." These are, first, treating nitrate of soda with "caustic potassa "direct, instead of with a salt of potassa, which is never free from "extraneous matters." "Equivalents of potassa and nitrate of "soda are used." The solutions are boiled together, evaporated, and drawn off into a crystallizer; saltpetre deposits; the mother liquor is evaporated again and re-crystallized. "The liquid portion forms a strong solution of caustic soda."

Second, preparing caustic potash by "causing hydrofluosilicic "acid to act on ashes of vegetable substances, especially the pulp "and radicles of beetroot, and to prepare soda by causing hydrofluosilicic to act on sea salt or chloride of sodium." "The "mode preferred for obtaining hydrofluosilicic acid is to cause "steam to act on fluor spar, combined with equal parts of silex, "in a reverberatory furnace, or in retorts similar to those used for "zinc, or by disengaging fluoride of silicium in a gaseous state "and immersing it in a receiver, wherein it is converted by contact with water into hydrofluosilicic acid." In preference, potash is extracted from the calcined ashes of the residues from beetroot sugar manufactories by "precipitating it by hydrofluosilicic acid," and boiling it in a close vessel with lime "till a "small quantity deposited or filtered ceases to be disturbed by "the lime water."

[Printed, 4*d*. No Drawings.]

A.D. 1858, August 17.—Nº 1878.

LICHTENSTADT, David, and DUFF, Charles.—(*A communication.*) — (*Provisional protection only.*) — "Improvements in "treating tan and tanning refuse to obtain valuable products "therefrom." These are, the tan after drying by the air is distilled "in close iron cylinders, generally used for distillation of "coal, and which cylinders are in communication with iron pipes "so constructed that the ligneous acid and the tar runs into a "lower cistern, and the hydro-carbonic gas from thence is con- "*ducted under* the fire-place of the above-mentioned distilling "apparatus to be consumed." The charcoal remaining in the cylinders is "prepared in two different ways."

[Printed, 4*d*. No Drawings.]

A.D. 1858, August 20.—N° 1896.

SPENCE, Peter.—"Improvements in the manufacture of "alum." These are, first, "the adaptation to alum pans or "coolers of rotatory or reciprocating mechanism," in order to obtain "small crystals or powder of alum."

"The fluid thus operated upon may be the solution of alum "first produced, that is, before a crystallization has been effected, "or it may be that which has been derived from crystals in the "ordinary manner, and it will be found that in the former of "these cases an article of considerable purity will be produced "without the expense attendant upon a second crystallization." Two modes of effecting this are given, one is by means of a shaft with arms, and the other by two arms mounted "so as to vibrate "upon centres."

Second, "treating shale or other such substance used in the "manufacture of alum with the waste gases arising from the "manufacture of sulphuric acid." The shale is placed in "apparatus similar to that known as the dry lime purifyer in gas "works," and the waste gases are passed through it, "the effect "of which will be a partial decomposition of the shale, to be completed as in the process" described in No. 10,970, "or other "methods to which it may be applicable."

[Printed, 6*d*. Drawing.]

A.D. 1858, August 27.—N° 1944.

EVANS, Frederick John.—"An improvement applicable to "gas purifying." The object of this invention is to obtain a material which will be energetic in its action, easy of production and inexpensive. To this end take turnings, borings, and filings of iron or scrap, or small pieces of iron in the form of shot, for example, and expose the same to gases or liquids, whether at ordinary or elevated temperatures, that will ensure their rapid oxidation. When the surfaces of the turnings, &c. of iron are completly coated with oxide or rust, the metal thus oxidized is ready for use in the dry gas purifyers, where it is to be employed in the *manner usually* practised when purifying gas with iron oxides obtained by other means. The mode preferred for converting iron filings, turnings, &c. into a purifying material, is to mix the same with the saturated purifying material, immediately it is removed from the purifier, when the chemical action of revivifying set up by exposure of the material to the air will assist in effecting the rapid oxidation of the iron, which may then be used with the revivified oxide for the purification of gas.

"When by repeated revivification and use the purifying " material is found to have increased in bulk by mechanical " admixture of sulphur therewith derived from the impure gas, " so as materially to impair its energetic action, the material is " submitted to a furnace heat, as heretofore practised, in order " to burn or drive off the sulphur, after which the material may " be again used as an efficient purifier."

[Printed, 4*d*. No Drawings.]

A.D. 1858, August 31.—N° 1981.

MARGESSON, PHILIP DAVIES.—" Improvements in treating " sugar canes and other canes containing saccharine matter, in " the preparation of food for animals, also in manufacturing " sugar and worts or wash for brewing, distilling, and vinegar " making, and in applying the resulting fibre in the manufacture " of paper." These are, the cane is " first cut into very thin " slices or reduced or cut by rasps or otherwise to a granular " form," and "in place of then separating the saccharine matter " therefrom" causing "the cut or reduced cane to be dried in " the open air or by artificial means," after which it is reduced to powder and pressed into casks or vessels or moulds.

[Printed, 4*d*. No Drawings.]

A.D. 1858, September 1.—N° 1988.

NEWTON, ALFRED VINCENT.—(*A communication from M. Le Chatelier.*)—" Improvements in the manufacture of alumina." These are said to be " the production of alumina." "*Iron ore " from Les Baux, near Arles, in France, and other similar ores, " either with silica or clay, or without,*" are digested in a strong solution of caustic potash or soda. " The ore may be digested " *at a high pressure with the same solution in one of Papin's " boilers.*" "The ore may be digested with the same solution in

“ cast or forged iron pans.” The ore may be calcined “ when
“ mixed with various sorts of kelp in a reverberatory furnace or
“ any other apparatus.” The ore may be mixed with “ sulphate
“ of soda, chalk, and charcoal,” and calcined. The ore in fine
pieces is “ treated with weak muriatic acid, which will decompose
“ the carbonate of lime which forms its gangue, or it may be
“ calcined at a red heat in a reverberatory furnace, or a lime kiln,
“ and thrown into water on coming therefrom, the calcareous
“ cement being carried off by washing;” thus prepared, charcoal
is added and the whole introduced into fire-clay retorts and brought
“ to a red heat and treated by a current of muriatic acid gas.”
proto-chloride of iron is “ volatilized and may be collected and
“ pure alumina will remain,” which is washed. The chloride of
“ iron being thrown into a red hot chamber “ is decomposed by
“ a current of hot or cold air forced in at the same time;” “ oxide
“ of iron is thus formed” and “ sesquichloride or perchloride of
“ iron (which is afterwards decomposed) and chlorine in a gaseous
“ form also result. This latter mixed with the azote of the
“ atmospheric air is conducted to apparatus, where it is condensed
“ in slacked lime to form chloride of lime, or employed for any
“ other purpose.” The ore may also be treated with concentrated
muriatic acid and heated to dissolve the iron, and mixed with
charcoal is submitted to gaseous hydrochloric acid to remove the
remainder of the iron. “ *Clays, Kaolines, and Feldspathic rocks*”
when “ submitted to the action of a caustic solution of soda,”
and likewise when they are melted or roasted with “ kelp, are
“ easily attacked.” Clay, “ associated with the iron ore of Les
“ Baux,” treated as above, “ has yielded up 72 per cent. of
“ alumina.” In the common clays silica prevails, and the result
is a silicate of the alkali with residuum of silico-aluminate of the
alkali which “ may be first treated with acetic acid or hydro-
“ chloric acid, and the mixture of acetate or of chloride decom-
“ posed by means of sulphuric acid;” in this way gelatinous
silica is obtained. “ In treating argils or feldspathic rocks with
“ soda or potash, and the silico-aluminate of soda or potash with
“ acetic acid by combining the processes” described in N° 413,
1858, with those described in this, “ the three elements of the
“ silico aluminate may be separated, or products extracted there-
“ from applicable to industrial purposes.” These products are
gelatinous silica, acetate of alumina, and soda, or potash, chloride
of aluminium which on calcining yields muriatic acid and alumina

and a mixture of fluosilicate of soda and of silica applicable "to " the manufacture of silicate of soda hydrofluosilicic acid and fluo- " silicate of alumina." "*Sulphates of alumina*" can be prepared " either directly by acting upon clays with sulphuric acid or by " roasting aluminous pyritous slates," &c. Chlorides of the alkalies are decomposed by roasting with sulphate of alumina, and the mixture of sulphate of the alkali and alumina " is treated " according to the ordinary process for manufacturing soda with " chalk and charcoal" and the carbonate of the alkali is formed. The residues of the sodium and aluminium processes are also employed for making alumina, &c. Both these residues are mixed together " in variable proportions according to the composition," and calcined either with or without charcoal and lixivated and the solution saturated with carbonic acid, carbonate of the alkali is in solution, and alumina is precipitated and is washed to remove the greater part of the carbonate, and may be formed into an acetate. " The filtration may be effected by means of a vacuum."

[Printed, 6*d*. No Drawings.]

A.D. 1858, September 7.—Nº 2018.

SHANKS, JAMES. — " Improvements in the manufacture of " chlorine." These are, " the use of chromate of lime in the manu- " facture of chlorine in connection with the mode of its recovery," as follows:—A quantity of chromate of lime is placed in a stove or other still, and hydrochloric acid is added until the liquid becomes of a grass green colour. When about half the chlorine has been expelled, " it may be desirable to apply heat by the usual means of steam " or otherwise, either internally or externally, as is commonly " practised in bleeching powder stills." The residue is run from the still into a tank, a quantity of hot water is added, and lime, in preference as milk of lime, is added with stirring to neutralize the acid, and a further quantity of lime is added to " precipitate " the oxide of chromium, and a further qunntity added sufficient " to combine with the chromic acid which will be formed in the " next operation." This precipitate is collected on a drainer, and afterwards manipulated in a furnace at low redness; with a free admission of air will soon change into " chromate of lime and be " ready to perform its part in the production of chlorine by the " *application* of a fresh quantity of hydrochloric acid."

[*Printed, 4d.* No Drawings.]

A.D. 1858, September 8.— N° 2036.

BROOMAN, Richard Archibald.—(*A communication from P. G. Barry.*)—(*Provisional protection only.*)—" An improvement " in the preparation of sulphate of quinine." This consists " in " treating quinine by liquid hydrocarbons instead of by alcohol " as heretofore." " Take the dry quinine and lime, as in the " ordinary method, then treat them with some liquid hydrocarbon, " preference being given to mineral oils, whereby the quinine will be " dissolved. Agitate the solution, and add water acidulated by " sulphuric acid; the quinine becomes converted into a sulphate. " After being left to settle, the oily essence will rise to the surface, " and may be used over and over again. The sulphate is evaporated " in the ordinary manner, and yields sulphate of quinine of fine " quality and regularly crystallized."

" The oils most suited to the purposes of this invention are, " rectified oil from boghead mineral, rectified shale oil, rectified " coal oil, rectified oil of petroleum, rectified oil of naphtha, " vegetable and animal oils, and sulphuret of carbon."

[Printed, 4*d*. No Drawings.]

A.D. 1858, September 11.—N° 2070.

GOSSAGE, William. — (*Provisional protection only.*) — " Im- " provements in the manufacture of soda and potash." These are, first, " the obtainment of carbonic acid gas " during " that " part of the operations of manufacturing soda or potash, which " consists of the decomposition of sulphate of soda or potash, by " means of carbon and lime at a red heat;" also, " the application " of such gas to the decomposition of sulphuret of calcium con- " tained in alkali waste and consequent extrication of sulphur."

Second. " The use of carbonate of lime (produced by the " decomposition of alkali waste by means of carbonic acid) for " the production of a further quantity of carbonic acid gas; also " the use of carbonate of lime so produced, or lime obtained " from such carbonate," for effecting the decomposition of sulphate of soda or of potash, in the manufacture of soda or potash.

Third. Decomposing sulphuretted hydrogen gas by sulphurous acid gas at lower temperatures than are indicated in No. 518, 1857, producing " compounds of sulphur applicable to the manufacture " of soda and potash;" also, " the use of aqueous solutions con- " taining certain salts of soda or of potash, and the use of steam

" for assisting to effect the decomposition of sulphuretted hydrogen " gas by the action of sulphurous acid gas, and for assisting to " effect the separation of sulphur after such decomposition has " been completed."

Fourth. " The use of compounds of nitrogen with oxygen for " effecting the decomposition of sulphuretted hydrogen obtained " from alkali waste, and consequent production of free sulphur " in a state suitable to be used in the manufacture of soda and " potash."

[Printed, 4*d*. No Drawings.]

A.D. 1858, September 18.—N° 2106.

LUIS, Jozé.—(*A communication.*)—" A new manner for applying " centrifugal force in the manufacture of the fecula of potatoes " of starch, of yeast, of porcelain paste, or paper pulp and ultra-" marine, and the apparatus for carrying out the same." This consists of " a metal drum, having the upper edge lapping over to " the inside about four to six inches;" the sides of the drum are pierced with holes, and are covered internally by a coarse metallic cloth, or by other combinations of similar nature. On this is placed a finer metallic cloth, and again on this a tissue of either " hemp, wool, cotton, or something similar, to retain the solid " particles and allow the water pass." The materials are in a tub mixed with water, and a pipe with a tap delivers them into the metal drum. Attached to the drum is a shaft, surmounted by a bevil pinion formed of leather rundles. This pinion is governed by a bevil wheel mounted on a horizontal shaft. It is by the friction of this wheel and the pinion that the shaft and consequently the drum is put in motion. "The drum can be made to " revolve from 12 to 1,500 times in a minute." A circular cast-iron receptacle surrounds the drum and receives the liquid, from which it escapes by a pipe.

[Printed, 8*d*. Drawings.]

A.D. 1858, September 21.—N° 2121.

BETHELL, John.—" Improvements in treating pyrites." These are, " grinding and washing " of sulphurets of iron " to free them " from coal and other extraneous matter;" they " can then be " advantageously used in making sulphuric acid, sulphur, or for " *other purposes* for which sulphurets are now used." The pyrites is ground "with a pair of iron rollers or in other convenient "manner," and then washed "with water, or in any of the machines "now used and well known for washing coals and ores, whereby "all the coal and extraneous matters will be separated and washed "away, and the heavy sulphuret left behind."

[Printed, 4*d.* No Drawings.]

A.D. 1858, September 25.—2157.

CLARK, William.—(*A communication from Emile Constant Martin.*)—"Improvements in purifying natural phosphates of "lime." These are, first, "the purification of phosphates of "lime, for the purpose of rendering them easier of transportation "and assortment, by treating them with an acid, such as hydro-"chloric acid for example, for the purpose of eliminating the "carbonates combined therewith." Before treating them with an acid, the quantity of carbonate of lime which is mixed with the phosphates is ascertained by analysis, and there is then added a sufficient quantity of pyroligneous or hydrochloric acid (diluted with a quantity of water, at least double the weight of the phosphates to be treated) "sufficient to decompose the carbonates of "lime, and transform them into chloride of calcium."

Second. "The purification of phosphates charged with silica "or silicates, by agitating them in water for the purpose of pre-"cipitating the silica, and then decanting the muddy liquid which "contains the phosphate of lime in a pure state." After the addition of the acid under the first head, the whole is placed in a suitable receptacle, the mass is then violently agitated for three or four minutes by means of a "stirrer formed of arms or pallets, "which are crossed by the same sort of fixed blades or pallets "attached to the inner sides of the vat or tub." "The shaft of "the stirrer is formed of two pieces in its length, the upper part "being always moveable, while the lower part can be fixed so as "not to disturb the deposit of the silicious matter." The liquid is then, while yet thick, decanted into a second receptacle. The silica remaining in the first receiver being of greater density than the phosphate, will be quickly precipitated. The whole operation is repeated several times, but employing unacidulated water until a pure phosphate remains.

Third. "Drying phosphates of lime, purified as described, in a "stove or in drying turbines or machines."

[Printed, 4*d.* No Drawings.]

A.D. 1858, October 4.—N° 2203.

NORMANDY, Louis A., junior.—(*A communication.*)—" Im-" provements in the manufacture of sulphate of copper." These are, " the solution of metallic copper, and the production of sul-" phate of copper by means of heat," as follows :—Three " wooden " tubes bounds with copper hoops," each about six feet high, and slightly conical, the diameter being about one foot at the top and sixteen inches at the base, are placed " successively below " one another, like the steps of a staircase, and are supplied from " a lead basin provided with a spout, which pours the liquid into " the upper tube, and thence into the next under it. The solu-" tion is collected from the basin at the lower tube, and put into " a reservoir or into the evaporating boiler." " A little above the " upper tube there is a lead boiler, into which " the dilute sulphuric acid " of 10° or 12° of Beaume's areometer is put " and heated from 86° to 100° F. The acid is continually running off from this boiler, regulated by means of a glass cock, so that the solution which flows from the last tube " should mark from 20° to 23° on " the areometer." The liquor falls on a perforated lead dish over the first tube. "The room in which the tubes are placed is kept " heated," " from 113° to 122° F." The tubes are fitted tightly with copper cuttings, turnings, and scraps, " so as to retard the " passage of the acid through them." " Every twenty-four hours " the scraps should be packed close by running them down with " a copper rod, and the dissolved copper should be replaced by " fresh scraps." The solution is " concentrated in a lead pan " until it marks 36° " and crystallized in a copper vessel.

[Printed, 4*d*. No Drawings.]

A.D. 1858, October 8.—N° 2242.

ROBERTS, Thomas, and DALE, John.—" An improved pro-" cess for obtaining salts of soda and other alkalies."

This consists, first, " for producing nitrites of the alkalies " " passing the nitrogenous gases evolved in the manufacture of " arsenic acid from nitric acid and arsenious acid " into the carbonates of the alkalies, but preferring " the alkalies in the " caustic state ; " or the nitrogenous gases are passed " into a " tower through which is made to flow the alkalies in question."

Second. Two equivalents of chloride of sodium or potassium are mixed with one of nitrate of soda or potash, and three equiva-

lents of sulphuric acid; sulphate of the alkali is obtained, and nitrous gas and chlorine evolved. "These mixed gases are con-
" ducted into a solution of sulphuric acid of the density of 1·50
" or thereabouts; the nitrous gases (as is well known) are
" absorbed," whilst the chlorine passes out, and may be combined with lime for the production of chloride of lime. In the Provisional Specification these reactions are not referred to.
" The solution of nitrous gas in the sulphuric acid is now libe-
" rated" by adding a quantity of water and "conducted into a
" solution of the alkali." The dilute sulphuric acid is concentrated.

Third, "Passing the waste nitrogenous" gases from other sources, as in the manufacture of picric acid, "into solutions of the
" alkalies."

Fourth. Decomposing chlorides of sodium, potassium, or ammonium by means of arsenic acid, arceniates of these salts are obtained and hydrochloric acid; or the nitrates of the alkalies are decomposed with the formation of arseniates and nitric acid is liberated. Arseniate of ammonia is obtained by using arsenic acid for the purpose of purifying the gas, or by adding arsenic acid to gas liquor.

Fifth. Stannate of soda is made by bringing a solution of caustic potash or soda, to which metallic tin has been added, to boil, and adding "so much nitrite of soda as shall be sufficient to
" effect the solution of the tin; the metallic tin is rapidly oxy-
" dized," and stannate of the alkali formed while "ammonia
" evolved is collected or conducted into arsenic acid."

[Printed, 4*d*. No Drawings.]

A.D. 1858, October 19.—Nº 2336.

GOSSAGE, William.—*(Provisional protection only.)*—"Im-
" provements in the utilization of alkali waste." These are, first,
" the separation of sulphuretted hydrogen from such mixed gases
" (obtained from alkali waste), and thereby obtaining carbonic
" acid gas of sufficient purity to be usefully applicable," by
" causing it to be decomposed either by sulphurous acid gas, or
" by compounds of nitrogen and oxygen, thereby causing the
" formation of water and the deposition of sulphur."

Second, oxydizing alkali waste by exposing it to the air, and extricating "sulphurous acid gas and carbonic acid gas from such

" oxydized waste by causing it to be acted upon by muriatic acid " or other acid liquors," and applying "sulphurous acid so extracted for the decomposition of sulphuretted hydrogen."

Third, "the extrication of sulphuretted hydrogen and carbonic " acic gases, also sulphur from alkali waste," by decomposing it by "such acid liquors as are obtained by the use of muriatic acid " in the manufacture of chlorine."

Fourth, "the production of sulphuret of iron" and of manganese, or "one of such sulphurets, by the action of alkali waste on " the acid liquors obtained in the ordinary manufacture of chlorine " by the use of muriatic acid, and the application of metallic sulphuret so obtained for the purpose of producing sulphurous " acid gas."

[Printed, 4*d*. No Drawings]

A.D. 1858, November 13.—N° 2554.

THOMAS, Christopher James, THOMAS, Thomas, THOMAS, Herbert, and THOMAS, Charles.—"An improvement in the manufacture of caustic alkaline lees." This consists "in the combination of the processes of purifying and " causticizing by one operation, instead of the present methods " of purifying first and then causticizing." Lime is added to the black ash liquor and the whole boiled, "at the same time " forcing or causing atmospherical air, by preference in finely " divided streams, to pass through and amongst the liquor and " lime in the pan or vessel, by which operation the liquor is " purified and causticized."

[Printed, 4*d*. No Drawings.]

A.D. 1858, November 15.—N° 2561.

DICK, Allan.—"A new or improved manufacture of a yellow " pigment." This consists in "manufacturing a yellow pigment " from the dross or oxide produced in the process of softening " lead, by heating the said dross or oxide in contact with air, " whether the said dross or oxide be treated with common salt or " any of the acids," as follows:—In preference, adding and mixing with the powder during the latter part of the calcining process a quantity of chloride of sodium or common salt, not exceeding half the weight of the powdered oxide. After calcining the dross or powder, sometimes saturating it with sulphuric, muriatic, or acetic acid, or exposing it " to the vapour of acetic acid in stacks of

" bark, after the manner practised in the manufacture of white " lead." "After the full effect of the heat has been produced, " and the quality of the pigment no longer improves, the powder " is removed from the furnace and washed and ground, when its " manufacture is complete." The dross, it is stated, which forms " on the surface of the melted lead, consists essentially of oxide " of lead and oxide of antimony."

[Printed, 4*d*. No Drawings.]

A.D. 1858, November 19.—N° 2622.

CLARK, William.—(*A communication from Emile Constant Martin.*)—" Improvements in purifying natural phosphates of " lime." These are said to be "treating the lumps or nodules of " phosphate of lime containing silica and carbonate of lime by a " process eliminating the silica by reason of the difference of den- " sity (and by means of an acid or of a salt). In the first place by " using hydrochloric acid, for example, for the purpose of decom- " posing the carbonates and forming soluble chloride of calcium " and carbonic acid, which disengages itself." The lumps or nodules of the phosphate of lime being powdered, the hydrochloric acid is added, and the chloride of calcium in solution is poured off, and the phosphate of lime and silica remaining are separated by agitating the mixture in water, and pouring off the liquid with the suspended phosphate from the precipitated silica. In the second place, "a certain quantity of phosphates of lime in pieces " or nodules is taken for the purpose of determining the propor- " tions of, firstly, the silica; secondly, the carbonate of lime; and " thirdly, the phosphate of lime required to be obtained. These " nodules, after being pulverized, are treated with the quantity " of hydrochlorate of ammonia necessary for completely eliminat- " ing the carbonate of lime; the mixture is then suitably heated " in a furnace or other appropriate apparatus for the purpose;" carbonate of ammonia is evolved "and is condensed to be ulti- " mately utilized in Wolf's apparatus; the chlorine of the hydro- " chloric acid also combines with the calcium of the lime, and " forms soluble chloride of calcium, which is then removed by " the same washing that effects the separation of the silica; lastly, " the hydrogen of the hydrochloric acid combines with the oxygen " of the lime and forms water."

[Printed, 4*d*. No Drawings.]

A.D. 1858, November 22.—N° 2649.

THEROULDE, FRANCOIS ALPHONSE.—"Improvements in "obtaining salts and products from the ashes of marine plants." These are as follows:—"A concentrated solution is prepared from "the ashes by causing successive quantities of water to pass "through successive layers of ash, so that each quantity of water "passes first through the layer of ash which is most nearly "exhausted, afterwards in regular order through all the subsequent layers, passing at each step from a poorer to a richer "layer, until lastly it passes through a layer of fresh ash." "The concentrated solution escapes to a large tank," which when full, "a sample is drawn off and analysed to ascertain the "quantity of potash which the solution contains." "A sufficient quantity of nitrate of soda is added to the solution to "convert all the potash into nitrate of potash," and the solution evaporated, to separate common salt and other soda salts, the salts being removed by a rake as they fall; when the liquor is "at 50° to 55° Beaumé the evaporation is stopped, and it is set "aside to crystallize." The salts precipitated during the evaporation are washed on drainers for small portions of nitrate of potash and iodide, and bromide of sodium, while steam is blown through them. The nitrate of potash crystallized from the above solution, is washed "in the manner ordinarily practised," and the mother liquor is further evaporated and crystallized. After three evaporations, the mother liquor has nitrous gas, in preference the gas evolved in the manufacture of oxalic acid, passed through it, and the precipitated iodine is washed and "converted "into iodide of potassium, or purified by sublimation." To the solution from the iodine, oxide of manganese is added, and chlorine gas is passed through the liquid, and the whole distilled as long as bromine passes over. The mother liquor is further evaporated and crystallized for nitrate of potash, &c.

[Printed, 4*d*. No Drawings.]

A.D. 1858, November 29.—N° 2706.

POSSOZ, LOUIS ANTOINE.—"Manufacturing alkalies and ob"taining simultaneosly other chemical products." This is said to be, first, "turning to account the causticity of alkalies during "the process of their manufacture, for the purpose of obtaining "*economically* ammonia, oxalates, oxalic acid, by the well known "*action of* alkalies upon organic matters."

Second. “The production of oxalates of potash and soda” as follows:—“Chlorides, sulphates, silicates of potash or soda, salines “of plants, or any other alkaline combination,” are brought to a state of caustic lye by any of the well known means,” and the lye is “concentrated until its boiling point is about 380° F.,” adding while it is between “320° and 400° one part of bran or other “organic matter mixed with five parts of manganate of potash,” continuing to heat “without raising the temperature above 500°,” until “the mass becomes a thick paste.” Or instead of using the same caustic alkali repeatedly as above, preferring “to operate “each time with new alkali.” To 250 or 300 parts of genuine caustic potash, or to 400 or 500 parts of genuine caustic soda in lixivium concentrated, the boiling point of the potash of about 400°, the soda 300°, adding “100 parts of organic matter, such as bran, hay, straw, guano, dry meat, blood, &c., &c., heating the whole mass gently. The ammonia is condensed with pure or acidulated water.

Third. “The production of oxalate of soda with pure soda, “not mixed with potash.” “The best heat for soda is from 300° to 400° F., and for potash from 400° to 500°.

Fourth. “Obtaining commercial products of potash or soda “with the mother waters of oxalate, which could not be obtained “from mixtures of soda and potash.” The alkaline mother waters, by this second process, are “chiefly composed of acetates, “ulmates, carbonates, and caustic alkali. When potash is the “basis, they are very suitable for manufacturing prussiate with “animal matters, and also with gaseous azote. When soda is “the basis, a certain quantity of acetate of soda may be ex“tracted by crystallization, and the remaining, or even the whole, “may be converted into carbonate of soda, dried or crystallized “by any means.”

Fifth. “The whole or general manufacture,” by which are produced, “very economically, alkalies,” and by which are obtained “simultaneously the other chemical products.” “The oxalates “of potash or of soda being crystallized and separated from the “mother waters, are decompounded either into acidulous oxalates “or oxalic acid by any of the well-known processes.”

For extracting oxalic acid from oxalates, particularly claiming “the means of treating the oxalates of potash or soda in solution “in water by milk of lime. There is produced, either by heat or “in the cold, an *oxalate* of lime, which precipitates, and the

" soda or potash are again to be found in a state of caustic lye. " The oxalate of lime, separated by decanting and well washing, " is afterwards decompounded by sulphuric acid into oxalic acid " and sulphate of lime."

[Printed, 4*d*. No Drawings.]

A.D. 1858, December 1.—N° 2740.

LAMING, Richard.—" Improvements in purifying gas, and in " turning sulphuretted hydrogen, carbonic acid, and ammonia, or " their compounds to profitable account." These are, "purifying " gas by scrubbing or washing it first with raw ammoniacal " liquor, finally with water, and intermediately with the mixed " products of those two scrubbings or washings subsequently to " their desulphuration by any means, either wholly or in part."

" Purifying gas by passing it through three or more scrubbers " or washers in succession; the first being used with a solution of " ammonia sufficiently free from saturating acids to convert both " the carbonic acid and the sulphuretted hydrogen of the gas into " soluble salts, and the remainder in succession with the same " portion of water for finally washing out the ammonia and its " compounds, combining the alternate oxidation of hydrated " sulphuret of manganese by atmospheric air, with the use of the " resulting compound for the total or partial desulphuration of " solutions containing hydrosulphate of ammonia."

" Preparing a compound of iron or of manganese for desul- " phurating solutions containing hydrosulphate of ammonia, or " for purifying gas, or other useful purposes, by decomposing a " solution of any muriate of either of those metals by means of " sulphuret of calcium, or available mixture or compound thereof, " and afterwards exposing the precipitate to the air to become " oxidized."

" Decomposing mixtures of sulphuret of sodium and a carbo- " nate of ammonia by heat, in the absence both of fluidity and " of temperatures high enough to drive off the carbonate of am- " monia undecomposed; also the presence in such mixtures, " when submitted to decomposition by heat, of carbonaceous or " other suitable absorbent matter for enabling one or both of the " re-agents to be added in solution, without the prejudicial inter- " ferences of fluidity or pastiness."

" Recombining the ammonia given off in the reciprocal decom- " *position of sul*phuret of sodium and a carbonate of ammonia

" with fresh carbonic acid, whereby it is made serviceable for a " repetition of the process many times in succession."

" Manufacturing solution or water of ammonia, more or less " pure, by receiving into cold water ammonia distilled from liquor " first deprived of sulphuretted hydrogen by revivifiable metallic " substances, and also of carbonic acid, if present, by lime, with " or without an intermediate purification of the ammonia during " the distillatory process. Also, the use of caustic solutions of " soda or potash, and of fixed oil, for the purification of ammonia " gas on its way to cold water by which it is to be absorbed."

" Distilling muriate of ammonia from mixtures of sulphate of " ammonia and common salt from earthen retorts into chambers " for condensing the vapours in detached crystals or flowers, and " the consolidation into cakes of flowery crystals of muriate of " ammonia by mechanical pressure."

" Obtaining as a precipitate, hydrated sulphuret of manganese " for oxidation by atmospheric air, by decomposing solutions of " the mixed sulphates of manganese and soda by sulphuret of " sodium, with the simultaneous production of sulphate of soda " in solution."

[Printed, 6*d*. No Drawings.]

A.D. 1858, December 14.—Nº 2859.

WEBSTER, JAMES.—" A new or improved method of recovering " copper and zinc from liquids which have been employed to dip " or pickle articles made of brass or other alloys containing " copper and zinc." This consists, " in precipitating metallic " copper from the saturated or partially saturated dipping liquid " or pickle by means of metallic zinc." " All the copper is pre- " cipitated in the metallic state, while the solution on evaporation " yields crystals of zinc salt. The whole of the zinc originally " contained in the solution, as well as that dissolved during the " precipitation of the copper, is obtained by the evaporation of " the liquid." " The dipping liquid or pickle from which the " copper and zinc are to be recovered is pumped" into a vat or cistern in which is placed zinc in strips or granulated in excess, and the whole is stirred; after precipitation of the copper the liquid is drawn into a lower vat, and after subsidence of any suspended metallic copper it is drawn into a boiler, where by evaporation all the zinc " is recovered in the form of zinc salt."

[Printed, 6*d*. Drawing.]

A.D. 1858, December 14.—Nº 2865.

SMETS, Jacques Théodore.—(*Provisional protection only.*) —" A method of making vinegar from a refuse product obtained " in the manufacture of starch." The refuse product is the residuum from "the manufacture of starch, and which is gene- " rally used for feeding cattle," and in which "remains from " about twenty to twenty-five per cent. of starch of excellent " quality, but of too fine a grain to deposit itself spontaneously, " and become detached from the thick particles with which it is " mixed." After this has settled four or five days it "is sub- " mitted to saccharification, either by using malt, or simply sul- " phuric acid in a wooden vat heated by steam or otherwise." If malt is used they are mashed up together, and strained and allowed to remain many hours together, and the result separated into the clear and thick part, and both are fermented, and the alcohol distilled from the thick part and filtered through charcoal is added to the clear liquor after the fermentation has terminated, and the yeast is taken off. If sulphuric acid is used chalk is added to neutralize any acid, and the matters are fermented by yeast " in all respects in the same manner to obtain the first liquor or " wine." The clear liquor or wine is amalgamated with the " filtered mucus," and allowed to remain from fifteen days to a month. Then the liquor is drawn off and placed in a vessel, three-fourths filled with beechwood shavings, "from fifteen days " to a month matures and clarifies itself completely, and is then " ready to be placed in the vinegar vases." These are tuns in which are beechwood cylinders forming a sort of cage stuffed with beech shavings; the cage is supported upon wooden axes through the ends of the tuns. "The place containing the vessels is to be " heated to a temperature of 75° to 85° F.," and a half turn is given every 12 hours to the cylinder for some days.

[Printed, 4*d*. No Drawings.]

1859.

A.D. 1859, January 8.—Nº 67.

CLARK, William.—(*A communication from Emile Constant Martin.*)—(*Provisional protection only.*)—"Improvements in puri- " fying natural phosphates of lime." These are, first, phosphate of lime in lumps or pulverized is placed in suitable receivers, furnished with agitators, along with an excess of acetic acid (pyroligneous acid); acetate of lime is in solution, and is decanted, and "there remains as residue pure phosphate of lime, with silica or " with silicates, which are separated by means of their difference of " density," as described in No. 2157, 1858. "These residues may " also be treated by means of hydrochloric acid, which dissolves the " phosphate alone, leaving as residue the silica and silicates, which " are separated by decantation." The solution of phosphate is distilled with stirring in a retort, the hydrochloric acid volatilizes, and is condensed to serve for other similar operations, there remaining in the retort "phosphate of lime in powder, and in a " pure state." "Five or six per cent. of lime may be added to the " mixture while in the furnace, which forms thus a tri-basic " phosphate of lime."

Second. The phosphate of lime in powder mixed with hydrochlorate of ammonia is distilled, carbonate of ammonia is evolved and condensed, and treated cold by chloride of magnesium, "regenerates the hydrochlorate of ammonia for other " similar purposes." The chloride of calcium is washed from the phosphate, and the silica or silicates are separated by washing and decanting, or by treating it with hydrochloric acid as above.

Third. The natural phosphate of lime in powder is mixed and distilled with the chlorides of magnesium, iron, lead, aluminium, or with any other volatile chloride. The chloride of calcium, silica, and silicates are removed as above.

Fourth. Unbroken lumps of the phosphate are agitated with hydrochloric or other acid, phosphate of lime is dissolved, leaving the silica or silicates, which are separated by decantation. The pasty mixture is distilled, the hydrochloric acid evolved is collected, and the residue treated with water, and the remaining phosphate dried in a stove, &c.; lime may have been added to it as in the first process.

[Printed, 4*d*. No Drawings.]

A.D. 1859, January 14.—N° 126.

DAUGLISH, JOHN.—" Improvements in obtaining carbonic acid " gas." These are, "the obtaining of carbonic acid gas from " carbonate of lime and other carbonates of the alkaline earths by " distillation in *closed vessels* or retorts, and collecting the car-

" bonic acid gas so obtained for use ;" also "the employment of " steam within the retort to facilitate the separation of the " carbonic acid gas; also the maintaining of a vacuum within " the retort during distillation in order to facilitate the separa- " tion of the carbonic acid gas." The retort, an ordinary iron gas one, has a joint between it and the cover, in which is a "washer of vulcanized india-rubber, and that this may not be " destroyed by the heat," the retort is constructed "with a water " neck." The neck is made double, as also the cover, and "a " circulation of water is maintained both in the neck of the " retort and the cover." In working the apparatus the retort is filled with an alkaline earth, in preference "limestone, chalk, or " whiting; the cover is then placed on the retort, and the charge " brought up to a low red heat," the "air pump is set to work, " and the air which is drawn out of the retort is allowed to escape " until carbonic acid is found to be coming in a pure state; it is " then directed into the cooling vessel, and from thence it passes " to a gasometer, in which it is stored." In some cases a jet of steam is thrown "into the retort to facilitate the liberation of the " gas."

[Printed, 6*d*. Drawing.]

A.D. 1859, January 27.—N° 253.

CROWTHER, William.—" Improvements in the manufacture " of prussiates of potash or soda, and in recovering a useful " material therefrom." These are, first, "dissolving animal " matter in alkalis before fusion," and in so doing "recovering " cotton or other vegetable material from the animal substance." Treating mixed woollen and vegetable fibrous substances "with a " hot solution of alkali (potash or soda), whereby the animal " matter becomes dissolved, leaving the cotton or other vegetable " substance; this having been allowed to settle, the clear liquor " is run off" and evaporated to dryness, sometimes adding "a " fresh quantity of animal matter to the solution;" the dry matter " is placed in the usual pot, and submitted to the required " temperature for fusion." The cotton or other vegetable substance remains "in a separated state, and may be washed and " applied to paper making and other manufacturing purposes."

[Printed 4d. No Drawings.]

A.D. 1859, January 29.—N° 264.

LEISLER, Louis.—(*A communication from Doctor Hasenclever.*) —(*Provisional protection only.*)—" Improvements in extracting " metallic copper from the pyrites residuum of vitriol works, and " from other substances." These are, treating the residuum " in suitable vessels with muriatic acid largely diluted with water," employing "in general from 20 to 50 lbs. of acid for every ton of " pyrites residue," "according to the nature of the pyrites." After a sufficient time "it dissolves the copper along with a certain " quantity of iron, and when the fluid is saturated it is run into " another vessel containing pieces of old iron, which precipitate " the copper in the metallic state. The fluid from which the " copper has been separated contains iron in the form of proto- " chloride, and it is exposed to the air for some days so as to " convert it into perchloride, after which a small quantity of " muriatic acid is added to it, and the mixture is used to act " upon another quantity of pyrites residuum, from which it " readily extracts the copper. The copper being separated by " iron as before, the fluid is again converted into perchloride, " and after being acidulated serves to extract a third quantity of " residuum, and so on as often as may be found convenient." When pyrites residuum is not completely burnt, and still contains copper as sulphuret, it is placed in heaps, which are moistened with "chloride of iron obtained from a previous operation, and " exposed to the air for some months," or until such time as the copper is oxidated, when it is acted upon by the acid solution of perchloride as above described, employing other acids, and particularly sulphuric in place of muriatic acid. This "process " is also applicable to any substance containing a small quantity " of copper mixed with much iron."

[Printed, 4*d*. No Drawings.]

A.D. 1859, February 1.—N° 292.

CROCKFORD, Charles.—(*Provisional protection only.*)—" A " mode or method of producing metallic sulphates." This consists in "exposing the oxides or chlorides of copper, iron, zinc, " and such like metals of commerce to the action of sulphurous " acid gas, and the vapour of water charged with air, whereby " they become converted into sulphates." Utilizing the sulphu-

" bonic acid gas so obtained for use ;" also "the employment of " steam within the retort to facilitate the separation of the " carbonic acid gas; also the maintaining of a vacuum within " the retort during distillation in order to facilitate the separa- " tion of the carbonic acid gas." The retort, an ordinary iron gas one, has a joint between it and the cover, in which is a "washer of vulcanized india-rubber, and that this may not be " destroyed by the heat," the retort is constructed "with a water " neck." The neck is made double, as also the cover, and "a " circulation of water is maintained both in the neck of the " retort and the cover." In working the apparatus the retort is filled with an alkaline earth, in preference "limestone, chalk, or " whiting; the cover is then placed on the retort, and the charge " brought up to a low red heat," the "air pump is set to work, " and the air which is drawn out of the retort is allowed to escape " until carbonic acid is found to be coming in a pure state; it is " then directed into the cooling vessel, and from thence it passes " to a gasometer, in which it is stored." In some cases a jet of steam is thrown "into the retort to facilitate the liberation of the " gas."

[Printed, 6*d*. Drawing.]

A.D. 1859, January 27.—N° 253.

CROWTHER, William.—" Improvements in the manufacture " of prussiates of potash or soda, and in recovering a useful " material therefrom." These are, first, "dissolving animal " matter in alkalis before fusion," and in so doing "recovering " cotton or other vegetable material from the animal substance." Treating mixed woollen and vegetable fibrous substances "with a " hot solution of alkali (potash or soda), whereby the animal " matter becomes dissolved, leaving the cotton or other vegetable " substance; this having been allowed to settle, the clear liquor " is run off" and evaporated to dryness, sometimes adding "a " fresh quantity of animal matter to the solution;" the dry matter "is placed in the usual pot, and submitted to the required " temperature for fusion." The cotton or other vegetable substance remains "in a separated state, and may be washed and " applied to paper making and other manufacturing purposes."

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" them;" "each of the pipes is provided with a branch" leading to the digesting vessel and also with other branches which lead downwards, for conveying the products of condensation into a drain. The branches are furnished with short pipes dipping below the liquid, "so that the gases from the digesting vessel are pre- " vented from passing out." A stream of water is constantly flowing into the vessel, and as it rises it flows into the branches and pipes "mixing with the gases and facilitating the condensation " thereof, but any that remain uncondensed pass along a passage " leading to the sulphur ovens where they become consumed."

[Printed, 6*d*. Drawing.]

A.D. 1859, February 22.—N° 488.

GOSSAGE, WILLIAM.—"Improvements in the utilization of " alkali waste." These are, first, "the use of carbonic acid pro- " duced by the decomposition of sulphate of soda," or of "potash " by means of carbon at a red heat for the decomposition of " alkali waste, and consequent production of sulphuretted " hydrogen from such waste."

Second. "The use of carbonate of lime obtained by the decom- " position of alkali waste by means of carbonic acid for the " production of carbonic acid therefrom, also for the production " of lime or compounds of lime capable of being applied to " useful purposes."

Third. "The obtainment of carbonic acid of such quality as to " be suitable to be used for the manufacture of bicarbonate of " soda, and for other useful purposes by the action of muriatic " acid, or of acid liquors produced during the manufacture of " chlorine."

Fourth. "The obtainment of sulphur from sulphuretted " hydrogen gas (evolved from alkali waste) by the action of sul- " phurous acid thereon at temperatures below boiling heat, such " action being facilitated by means of an apparatus which provides " for mixing the gases by causing these to be alternately col- " lected together, and spread about during their transit through " such apparatus." The gases are introduced "into a rectan- " gular chamber containing a series of inclined shelves so " placed, that the gases being introduced at the upper part " of such chamber are caused to pass through an aperture or " apertures existing between one pair of shelves in the centre," and "alternately through an aperture or apertures existing " between the ends of another pair of shelves and the end walls " of the chamber."

Fifth. "The obtainment of sulphur from sulphuretted hydrogen " gas (evolved from alkali waste) by the action of the gaseous " compounds of nitrogen with oxygen thereon."

[Printed, 4*d.* No Drawings.]

A.D. 1859, February 24.—N° 505.

WAGNER, Jean Henri Guillaume Daniel.—"Apparatus for cleaning water and removing all matters in suspension " and dissolution contained in it; water intended to feed generators of all sorts (applicable also to other purposes) which, " besides, previous to its getting into the generators, is heated " to the highest degree, without almost any expense." The principles involved in the construction of this water purifyer are :— 1. The subdivision of the water to be purified into thin continuous films, to be heated while in this continuous state. 2. The double traverse of the film over the two surfaces of the partitions, upon which are deposited and retained all incrustations. 3. The heating of the film by the action of steam. 4. The condensation of the escaping or waste steam during its continuous flow, being increased by means of the partition work in the interior of the apparatus, the flow being always inversely to that of the water, &c. to be heated.

In reference to the 2nd claim in the Specification for the application of the apparatus (among other things) to "salt and gas " works," no particulars are given. And in the 9th, the apparatus is stated to be applicable to "any purpose whatever; instead " of steam, any air or gas, heated or not, may be introduced in " order to produce concentrations, crystallizations, evaporations, " liquefactions, solidifications, calefactions, refrigerations, separations, divisions," &c.

[Printed, 2*s.* 8*d.* Drawings.]

A.D. 1859, February 24.—N° 506.

DALE, John.—" Improvements in concentrating caustic alkalis, " and in applying a product therefrom to the purpose of obtaining motive power and to other purposes." These are, " the use " of steam *arising from* the evaporation of solutions of alkalis to

" the evaporation of alkalis or other fluids in another vessel or " vessels, and also to the purpose of obtaining motive power." The fluid to be evaporated is placed in a close vessel and heat is applied and the "steam may be caused to pass into a coil of piping into a " false bottom or other ordinary evaporating apparatus." This vessel may be open or closed, and from it the steam may be conveyed to a third vessel, and so on through a series of any practicable number. "When used for the purpose of obtaining " motive power," it is conducted at once to an engine, or it is " applied to generate steam in a boiler," or it may be passed into a vessel so as to constitute a reservoir of steam, and if desired, " may there be superheated, or the steam instead of being used to " evaporate a second, or any other number of vessels of alkali, may " in like manner be employed for the evaporation or concentration " of other fluids."

[Printed, 4d. No Drawings.]

A.D. 1859, March 7.—N° 594.

GOSSAGE, William.—"Improvements in the treatment of " certain ores of copper for the extraction of metals therefrom." These are, as follows:—The residuum from the burning of sulphureous copper ores after calcining in the manufacture of sulphuric acid, " contains the iron of the ore mostly in the state " of peroxide of iron, and the copper of the ore partly in the state " of sulphate of copper, partly in the state of sulphuret of copper, " and usually some oxide of copper. This residuum also con- " tains silver when such metal has been present in the ore " employed;" it is ground, lixiviated with hot water, and sulphate of copper is obtained from the solution by crystallization, or metallic copper by precipitation. The undissolved portion of the residuum is subjected to a hot solution of per-sulphate or per-chloride of iron, or a mixture of the same obtained as afterwards described, preferring to use a solution of per-sulphate, either with or without the addition of a small quantity of sulphuric or muriatic acid, by which the sulphuret and oxide of copper becomes dissolved, and the resulting salt is washed out by water; the peroxide of iron remaining is suitable "for the pro- " duction of metallic iron by the ordinary process of smelting ores " for iron." "By the action of salt of peroxide of iron on " sulphuret of copper and sulphuret of iron persalt of iron" becomes converted into proto-salt of iron which is reconverted into per-salt, to be used again as above, by causing it to absorb oxygen from the air. This conversion is effected by evaporating the solution to dryness and exposing the salt thus obtained to air in a furnace or oven "sufficient to effect the "absorption of the oxygen by the salt of iron, with the least "extrication of acid therefrom." The per-salt thus produced is dissolved with hot water, leaving undissolved a quantity of peroxide of iron in a state of fine division suitable for the production of colcothar or Venetian red, or for other purposes. When the residues contain silver, adding common salt to the solution of per-salt of iron employed, the silver is in solution as chloride and may be precipitated from it "by means of "metallic copper, or by other well-known means." In extracting copper from such residues as above, the solutions of per-salt of iron "obtained from copper mines or from heaps of minerals con-"taining sulphureous copper pyrites exposed to the action of the "air and water," and which solutions are commonly known as "mine waters," are employed as above. In precipitating copper from solutions of this metal, using "either metallic iron obtained "by deoxydizing oxide of iron contained in burned residua of "sulphureous ores of copper," or using "protosulphuret of iron "prepared by smelting such burned residua." The above metallic iron is prepared by heating under certain circumstances the oxide of iron above and charcoal. The protosulphuret of iron is prepared "by mixing eight parts of burned residuum of sulphureous "coppery pyrites with two parts of coal in coarse powder, two "parts of sulphureous coppery pyrites (unburned), one part of "slaked lime, and three parts of sand," introducing "such mixture "into an ordinary furnace used for smelting copper ores" and fluxing it, "so as to produce slag and regulus." "The regulus "so produced contains a large proportion of proto-sulphuret of "iron in a state capable of effecting the precipitation of copper "from solutions in the state of sulphuret of copper, which is "convertible into metallic copper by well known means," and the "copper previously contained in such ores is obtained along with "the precipitate."

[Printed, 4*d*. No Drawings.]

A.D. 1859, March 16.—N° 656.

SEYMOUR, George.—(*Complete Specification, but no Letters Patent.*)—(*A communication from* Hypolite Leplay.)—"Improve-

"ments in making refined sugar, and making potash and soda "from the residues." These are, treating the saccharine solution from whatever source with an excess of a solution of caustic baryta or sulphuret of barium, collecting the "saccharates of "baryta" and washing them, and placing them in a vat and forcing a strong current of carbonic acid gas through them by means of a pump, carbonate of baryta is formed leaving the sugar dissolved in the water. The complete decomposition of the saccharite of baryta "is ascertained by the presence of hydrosul- "phuric acid in the mass, which is ascertained by a test paper "prepared with a solution of subacetate of lead, which will be "discoloured or darkened by its presence," no colour being produced when the decomposition is incomplete; the carbonate of baryta is put into cotton sacks which are pressed. The liquid, "now an almost pure" solution of sugar containing a small quantity of bicarbonate and carbonate of baryta, is boiled down, and a small quantity of a soluble sulphate, such as lime, or of alumina added, which gives "rise to two insoluble compounds;" the syrup is "now clarified by a small quantity of albumen, and "is filtered by a Taylor's filter." The mother and other waters contain caustic baryta, which is extracted as carbonate by "inject- "ing carbonic acid," or in the form "of crystals of hydrate of "baryta by evaporation and cooling." "The water also contains "salts of soda and potash in considerable quantities." These are obtained by evaporating the water and calcining the residue in a reverberatory furnace.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1859, March 30.—N° 799.

GOSSAGE, WILLIAM.—(*Provisional protection only.*)—"Im- "provements in the manufacture of certain alkaline silicates, and "in the production therefrom of liquor silicis or liquid flint." These are, first, using in such manufacture carbonates of potash or of soda which have "been previously deprived of sulphate of "potash or of soda." The liquid flint is thereby "free or nearly "free from alkaline sulphuret."

Second, "purifying liquid flint made from soluble glass so as "to destroy or neutralize such alkaline sulphuret as may be pre- "sent therein," by means of "oxidising agents, such as chlorine "or oxygen," thereby rendering it "no longer hurtful in the "useful application of such liquid."

[Printed, 4*d.* No Drawings.]

A.D. 1859, April 1.—N° 819.

NEWTON, William Edward.—(*A communication from Samuel Cooper.*)—" An improved process of manufacturing sulphate of " lead, carbonate of lead, nitrate of potash, and sulphate of soda." This consists, first, in " decomposing a solution of nitrate or " acetate of lead by sulphuric acid." The nitrate or acetate of lead solution is treated with sulphuric acid which is gradually added. The sulphate of lead precipitates and the nitric or acetic acid eliminated " may be employed for the purpose of dissolving " the lead.

Second, "manufacturing carbonate of lead by decomposing " sulphate of lead with pearlash ;" likewise " manufacturing saltpetre and sulphate of soda of the residuum of the above process " combined with nitrate of soda," and "carbonate of lead, saltpetre, and sulphate of soda out of sulphate of lead, pearlash, " and nitrate of soda." " 25 lbs. of sulphate of lead are added to " a saturated solution of 10 lbs. of pearlash in water;" " sulphate " of potash and carbonate of lead" are formed, and the latter " may be separated from the solution of sulphate of potash by " decanting or drawing off." "The sulphate of potash is now " decomposed by the addition of nitrate of soda, 12½ lbs." "The " materials employed are thus all converted into merchantable " products, viz., carbonate of lead (the white lead of commerce), " nitrate of potash (saltpetre), and sulphate of soda (Glauber " salts)" The process may be slightly varied by decomposing the nitrate of soda by boiling it with the pearlash, the result is nitrate of potash and carbonate of soda to be separated by crystallization ;" the " carbonate of soda is then employed to decompose " the sulphate of lead ;" or " the nitrate of soda, the sulphate of " lead, and the pearlash may be mixed together, whereupon a " triple decomposition will take place."

[Printed, 4*d*. No Drawing.]

A.D. 1859, April 8.—N° 879.

MENNONS, Marc Antoine François.—(*A communication from B. de Siebenthal.*)—" Improvements in the treatment of " mineral phosphates of lime." These are, eliminating " from " fossil phosphates of lime the carbonates of lime and silica with " which they are combined in their natural state, so as to render " them *to a high degree* soluble and assimilable for agricultural

" purposes," as follows:—say, two tons weight of the natural phosphate containing from 40 to 45 per cent. of pure phosphate are crushed, and from 1½ to 2 tons of concentrated or diluted hydrochloric acid of commerce are poured upon the mass and the whole agitated if required. When the action is over the supernatant liquid is drawn off, and the siliceous residue is "submitted to " the action of a centrifugal separating apparatus." The solution is then treated with ammonia so as to precipitate the phosphate, which is treated by the centrifugal separating apparatus which " leaves the pure phosphate of lime in almost a dry state." Instead of using "the centrifugal machine after decantation, the " gelatinous residue may be directly dried by heat (with the addi- " tion of a carbonizable matter such as coal dust) if a black pro- " duct is required." In this way "a certain quantity of pure " sublimed chloride of ammonia is thus obtained," but the phosphate of lime contains chloride of calcium, so that the centrifugal process is preferred "when a pure product is required." The mother liquor may be economised by many known processes, as " evaporation and crystallization for the production of crude " chloride of ammonia;" "saturation with lime and distillation " for the production of caustic ammonia;" decomposition by caustic magnesia into ammonia and chloride of magnesium" from which ammonia is distilled off, and the chloride of magnesium at a higher temperature yields hydrochloric acid, and magnesia with a little "chloride of calcium remains in the retort."

[Printed, 4*d*. No Drawing.]

A.D. 1859, April 8.—Nº 883.

HENDERSON, William.—" Improvements in treating certain " ores, and in obtaining products therefrom." These are, first, " separating and obtaining zinc and other metals from zinc ores " and other ores containing zinc," as follows:—If the ores contain sulphur they are calcined, if they contain a large proportion of iron, five per cent. of common salt must be added to the ore in the calcining furnace; after calcining, the ores are ground and placed in vats having agitators and with false bottoms and covered with dilute muriatic acid, and acid employed until the whole of the zinc is dissolved. If zinc alone is in solution milk of lime is at once added. When the ore contains much lead weak muriatic acid is used, by which " most of the lead is left insoluble in the " vats." If lead or copper, or both, are in solution " they may be

" precipitated by scrap iron or sulphuretted hydrogen, or the lead " may be precipitated by sulphuric acid as sulphate, and the zinc " then be precipitated as carbonate by continuous boiling with " carbonate of lime, and the iron may after separation of the zinc " be precipitated by caustic lime, as hydrated oxide of iron." The acid may be recovered from the chloride of calcium solutions as described in N° 2517 — 1857. The manufacture of hydrated oxide of iron as above and as afterwards described is claimed.

Second, extracting antimony from poor and mixed ores, and separating lead, silver, and copper from antimony, as follows :— The ore, when a sulphuret, is reduced to a fine powder and mixed with a proportion of salt, " an excess of salt is preferable in all " cases," and calcined with exposure to air and stirring " anti- " mony, with some arsenic, iron, sulphur, and other metals distil " over in the state of chlorides." These are passed, in preference, into " a tower filled with coke or pebbles with a stream of water " trickling downwards." A small jet of steam converts the chloride of antimony into hydrochloric acid which is condensed by the water, and white oxide of antimony which " is collected in " settlers properly arranged at the base of the tower." When the calcination is complete the whole of the antimony is sub-limed, leaving " lead, copper, silver, and several other metals and oxides, " together with undecomposed salt and sulphate of soda," which " may be separated and reduced by any known means." " When " the ore contains no sulphur the metals should be converted into " chlorides by muriatic acid, and then evaporated to dryness and " calcined ;" the result is the same as above.

Third, treating copper ores, as follows :—These ores are first calcined in heaps, kilns, or furnaces, crushed, treated in vats with muriatic acid until exhausted, " the copper is precipitated from " the solutions with iron or sulphuretted hydrogen," and the oxide of iron is thrown down from the solution by caustic lime, and the acid may be produced from the chloride of calcium.

Fourth, separating and extracting the oxide of cobalt from ores and products, as follows :—The chloride of iron liquors are evaporated to dryness, and the residue decomposed " by heat and " steam, or jets of water," by which the chlorides of iron " are " converted into oxides, whilst the chloride of cobalt remains un- " decomposed and is dissolved out by boiling water ;" chloride of zinc, &c., remain undecomposed if they existed in the original solution. The oxide of cobalt is obtained free from these impurities by boiling the solution of cobalt with a strong solution of bleaching powder, and washing the precipitate with very dilute sulphuric acid.

Fifth, "separating and extracting gold and silver from their " ores," and " the use of alkaline salts or compounds, or peroxide " of manganese and common salt, with muriatic acid and sul- " phuric acid," for so doing. The gold ores are divided into two classes, namely, into first, iron and copper pyrites and ores, and second, into auriferous quartz. Ores of the first class are calcined sufficiently to form, " when smelted with copper ore (if " necessary), a regulus or matt of from 30 to 40 per cent. copper." " About 56 lbs. of such regulus should be produced for every ton " of ore." To this melted regulus is added, in preference, " two " parts anhydrous sulphate of soda (salt cake), and one part coal " or other carbonaceous matter," and heated and the regulus tapped into sand moulds, and the pigs while hot thrown into water; they disintegrate, and " the sulphuret of sodium will dis- " solve out, holding in solution the sulphuret of gold, from which " solution it is thrown down by adding an excess of sulphuric, " muriatic, or other mineral acid," preferring to use sulphuric acid. " If silver exists in the original ore it will remain with the " copper regulus," and may be separated when it has accumulated by calcining the regulus in a fine state of division, the sulphate of silver is dissolved in boiling water and the silver precipitated by copper plates, or by calcining with common salt, &c. The auriferous quartz and gold ores of the second class powdered, are calcined to deprive them of sulphur, or they are powdered after calcination, and placed, in preference, into vats with false bottoms, and the whole surface of the ore is covered with muriatic acid " of about " 15° Twaddle's hydrometer, and allow it to penetrate through " the body of the ore." The liquor is washed out and " the " quartz thus prepared is covered with aqueous solution of " chlorine, and the solution of the gold at once takes place." The liquid as it passes through the ore is " repeatedly pumped to " the top of the ore." In 24 hours the whole of the gold is dissolved, the liquid is boiled, the chlorine evolved condensed, and the gold " precipitated by protosulphate of iron, oxalic acid, or " other precipitant." If silver was in the ore it will remain behind and may be separated by a boiling strong solution of common salt, or a warm solution of hyposulphite of soda, from which it is "separated by plates of copper," &c. If the quartz contained peroxides of manganese, cobalt or even iron soluble in the weak acid with which the ore was first treated, small quantities of gold, and always more or less silver will be dissolved. Before throwing it away it should be boiled with scrap iron or zinc and the liquid run off from the precipitated metals. In some varieties of gold quartz the gold is only partially or not at all dissolved by chlorine in solution or as gas, these are treated as follows, the ore before or after washing with acid, but dry, is mixed with from 1 to 5 per cent. of peroxide of manganese or other oxide, "liberating chlorine " from muriatic acid," and "moisten this mixture with strong " muriatic acid of at least 1·125 sp. gr.," and "gathered closely " together, and allowed to heat of its own accord in a dry place " for 24 hours," after which it is put into the vats with false bottoms and "steam of a high pressure (say 60 pounds) is then slowly introduced under the false bottom." The liquid containing chlorides of gold and manganese is boiled with protosulphate or protochlorine of iron, the former preferred, so as to precipitate the gold. A mixture may be made of common salt, oxide of manganese, and the ore, moistening with concentrated sulphuric acid, but it is preferred to use the oxide of manganese and muriatic acid. "When much silver exists in the quartz" it is "treated " with hot saturated solution of common salt, immediately after " the washing with dilute acid and before the treatment with " chlorine." The preliminary treatment of gold ores and quartz with weak acid is claimed.

Sixth, dressing lead and other ores by crushing "the rough ore " as near as possible just as fine (and no finer) as will liberate each " particle of ore from the matrix, so that none of the particles of " ore remain encased in the matrix." This is effected by millstones and sieves.

[Printed, 6*d*. No Drawings.]

A.D. 1859, April 9.—N° 886.

SPENCER, Thomas.—"Improvements in the economical treat" ment of refuse or waste matter containing sulphur." These are, first, treating such waste matter as is produced in the ordinary manufacture of soda or potash from sulphates of soda or potash, " known as alkali waste or tank refuse," also to "waste gas " lime" from purifying gas, "to obtain sulphur from such waste " matters."

Second. "To the extraction of sulphur from certain liquors "which result from the action of water upon the waste matters "herein-before mentioned." These substances are treated with acids, such as hydrochloric acid or carbonic acid, and the sulphuretted hydrogen gas evolved is brought "into contact with "certain oxides of iron or of maganese (hereinafter specified)," producing "a compound from which such sulphur can either be "separated and obtained as pure sulphur by distillation in close "vessels, or can be burned off with atmospherical air producing "sulphurous acid gas." The oxides preferred, are "all such "oxides of iron as contain a less proportion of oxygen than is "contained in peroxide of iron, also a certain compound" designated "carbide of the magnetic oxide of iron," the manufacture of which is described in No. 1415, 1858. When "hæma-"tite ores or oxides of this character, including such oxides as is "produced by calcining iron pyrites with common salt" are to be used, it is preferred "to subject them to a previous heating in "closed vessels, either alone or preferably in mixture with car-"bonaceous matter." The oxides of manganese are the native black oxide or peroxide, the native brown oxide or sesquioxide or various artificial oxides; if peroxide is used it is calcined as above. When ores are used which are sluggish, they are heated to above 212° F., while the gas is brought into contact with them.

[Printed, 6*d*. Drawings.]

A.D. 1859, April 9.—N° 891.

JOHNSON, JOHN HENRY.—(*A communication from Jean Victor Lucas.*)—"Improvements in the manufacture or production of "the ferrocyanide and cyanide of potassium." These are, first, "the application and use of wood, charcoal, coke, or other similar "porous material for the purpose of maintaining the carbonate of "potash in as divided a state as possible, when submitted to the "action of heat and ammoniacal gas." The carbonate of potash is dissolved in its own weight of water, when a sufficient quantity of the carbonaceous matter is added to "completely imbibe the "solution of carbonate," the whole is now heated until it becomes thoroughly dry.

Second. "The peculiar process for producing ammoniacal gas, "and its combination with the means described for making "prussiate of potash and cyanide of potassium," "the general "construction and arrangement of apparatus" and "peculiar "arrangement of furnace, provided with two fireplaces, and "suitable retorts for the manufacture of prussiate of potash and "cyanide of potassium." The prepared charcoal described above, with an addition of five parts in weight of iron filings, is introduced into two retorts placed vertically in a furnace. The retorts are now heated to expel all moisture, and to reduce "the car-"bonate of potash to the state of peroxide of potassium." Whilst the retorts are at a white heat ammoniacal gas is introduced into them, "the yellow prussiate of potash will be obtained." The ammoniacal gas may be obtained in various ways, but it is preferred to produce it from equal weights "of sulphate of "ammonia and quicklime" "in a vertical retort." "The gas "enters the bottom of the first retort containing the charcoal, "and acting on the potash converts it into prussiate of potash. "On leaving the first retort, the gas enters the bottom of the "second retort, and finally escapes by a pipe or chimney for that "purpose." "The conducting pipes may be fitted with valves "for the purpose of intercepting at pleasure the passage of the "gas. The manufacture of cyanide of potassium is accom-"plished in a precisely similar manner to that above described, "with this exception, that the addition of the iron filings is "dispensed with."

[Printed, 8*d*. Drawing.]

A.D. 1859, April 16.—N° 957.

NEWTON, WILLIAM EDWARD.—(*A communication from Mr. Le Chatelier.*)—"Improvements in the manufacture of alumina." These are, "precipitating alumina, either pure or in combination "with other substances, from its solutions in alkalies, in the state "of aluminate of soda or potash," in a number of ways as follows, by means of carbonic acid, the alumina precipitated is separated by decantation and by filtration, either on the centrifugal principle, in a "turbine," or "in vacuo." This last method of washing is described and is also applicable "to other precipitates obtained "during the processes hereafter described." The alumina precipitated as above contains soda or potash, which it is said is not the case when the alkaline aluminate solution is treated with a solution of bicarbonate of soda or potash and digested; "the "first liquors obtained by filtration may be employed for the "*production of crystallized* carbonate of soda." Bicarbonate of ammonia or carbonate of ammonia may be employed. Acids may be employed to throw down the alumina; "thus the aluminate "of soda exposed to the last vapours of sulphuric, muriatic, "nitric, or other acids," may be the means of completely condensing them, and "at the same time of obtaining either alumina "or salts of alumina." "The hydrochlorate of ammonia easily "decomposes the alkaline aluminates," and alumina is "precipi-"tated as pure as in the former case." Adding together solutions of "chloride of aluminium and aluminate of soda, in which "the proportions of sodium and chlorine are equivalent; the "whole of the alumina is precipitated, and common salt only "remains in the liquor." Chloride of aluminium is prepared by digesting "the ore from 'Les Baux,' at a temperature not exceed-"ing 50° or 60° centigrade with commercial hydrochloric acid," evaporating the solution "to a syrup-like consistence and then "cooling," a mass is formed which "is drained dry in a funnel-"shaped vessel, the neck of which is closed by some spongy "substance," the "liquid perchloride of iron is separated, and "the perchloride which remains adherent imbibes moisture from "the open air and runs through also." The "chloride of alumi-"nium remains almost pure," and is removed by washing with a saturated solution of purified chloride of aluminium, or it may be dissolved and purified by the yellow prussiate of potash, or by other suitable means. The hydrated chloride thus obtained may be used for decomposing the aluminates, or it might be applied to any suitable industrial purpose. "The alumina may be also "extracted from the chloride by precipitation, by means of caustic "or carbonated soda or potassa without excess, or by ammonia, "lime, or carbonate of lime, &c.;" or "for the preparation of "metallic aluminates." "The alkaline aluminates may be de-"composed by the soluble salts of lime, magnesia, or baryta, the "base of which will precipitate itself in intimate combination or "mixture with the alumina, the mixture being homogeneous," in this way "preparing clay for the manufacture of pottery and "earthenware." Alkaline bromides are extracted from "the "brine waters of the salt lakes or salt springs," by adding to them "a solution of aluminate of soda containing a quantity of "soda." The magnesia will be precipitated with the alumina, and "the solution of chloride of sodium, of sulphate of soda, and "*of bromide of* sodium, thus obtained, will by successive evapora-"*tions furnish* a salt very rich in bromine." The aluminate of

" magnesia on being treated with a weak acid, " will give up its " alumina," or it is " converted into alumina ore and treated for " the preparation of aluminates by the carbonate of soda or by " any other suitable process." By the reaction of metallic salts upon the alkaline aluminates, metallic aluminates or lakes are formed, and which may be made to differ " in their composition as " much as required, without any alteration in the process and by " mere changes in the composition of the reagents used." " Organic lakes may be obtained by reacting upon alkaline " aluminates with organic matters of any kind, but having the " property of disengaging alumina and uniting with it in its in" soluble state, or by mixing unprecipitating organic matters in " solution with alkaline aluminates and precipitating the alumina " by one of the processes above specified." Alumina is purified from alkali, which adheres to it by moderately calcining it and washing it, or by adding to it " a small excess with regard to the " alkali of muriatic or some other acid;" or " by adding chloride " of aluminium, or some other salt of soda, and leaving the mix" ture to digest." When the presence of iron is to be avoided, in calcining the ore from Les Baux, a small quantity of charcoal is introduced into the mixture. If the solution of alkaline aluminate contains iron in a state of ferrate, a partial precipitate is formed by carbonic acid, or any other acid which " would bring " it down." If the iron " is a sulphuret, it might be super" oxidized by means of chlorine." Whenever precipitated alumina contains iron, in preference it is calcined before dissolving in a concentrated caustic alkali. " The alumina may " be dissolved in an acid, more especially hydrochloric acid, and " the iron precipitated " by prussiate of potash, " sulphuretted " hydrogen, or by an alkaline sulphuret," the clear liquid is " evaporated and the residue calcined or precipitated by an alkali " or lime." Alumina is obtained free from iron in treating ore from Les Baux with hydrochloric acid, as described in Nº 1988–1858, and treating the residue " in the same way as alumina ore," with carbonate or caustic soda free from iron.

"The ore from Les Baux," specified in Nº 1988–1858, contains " a certain proportion of vanadium," forming " an alkaline vana" date mixed with the aluminate." If this metal is to be extracted " it will be convenient to use as a reagent for precipitating alu" mina sulphuretted hydrogen produced in any convenient " manner." "*This process* might also be made the means of

" obtaining the sulphuretted hydrogen combined in mixtures " with other gases by decomposing the sulphuret of sodium with " carbonic acid or any other acid."

[Printed, 6*d*. No Drawings.]

A.D. 1859, April 26.—N° 1045.

NEWTON, William Edward.—*A communication from Madame Lefebvre.*)—" Improvements in the manufacture of nitric acid, and " its application for the production of artificial nitrous or nitric " salts." This invention relates to the production of nitric acid or its salts by the electro-decomposition of atmospheric air, and the subsequent absorbtion of the gas thus produced by water or by alkaline solution.

In a small apparatus, described in the Specifications and shown in the Drawings, the air is contained in a globular vessel, the narrow neck of which is inverted over a vessel containing water or an alkaline solution. "In the centre of the inverted vessel, " the two poles of a battery are made to nearly meet, and by " giving out an electric spark, the air contained in the vessel " will be decomposed, and a continuous stream of atmospheric " air being supplied to the vessel through a suitable opening, this " action may be kept up for any length of time. The water in " the lower vessel may also be decomposed by means of electricity, " and made to give off oxygen, which will combine with the " nitrogen given off from the air, thereby forming nitric acid." An apparatus for manufacturing on a large scale is also described and shown. It consists of an acid-proof chamber, at the bottom of which is a vessel containing water or an alkaline solution. The sides of the chamber are provided with openings for the admission of the electric wires and of air. Pipes and cocks for the supply and discharge of the liquid are added.

[Printed, 8*d*. Drawing.]

A.D. 1859, May 2.—N° 1099.

GOSSAGE, William. — (*Provisional protection only.*)—" Im- " provements in the manufacture and useful application of cer- " tain alkaline silicates, and in the production of liquor silicis or " liquid flint." These are, first, "in using for the manufacture " of such silicates carbonates of potash or of soda which have " been previously deprived or nearly deprived of sulphates of

" potash or of soda thus obtaining " soluble glass of such quality " that the solution of liquid flint produced from it is free or " nearly free from alkaline sulphuret."

Second, applying such solutions to rendering stones, bricks, wood and other building materials impermeable to water, also paper hangings and distemper colouring, and " to the production " of water proof fabrics by causing insoluble silicates to be pre- " cipitated from liquid flint in the fibres of fabrics constructed of " linen, cotton, or other fibrous materials."

Third, manufacturing silicate of lime by decomposing solutions of silicates of potash or of soda by means of carbonate or caustic lime, or by boiling, readily soluble native silica, with a mixture of caustic lime and caustic potash or soda in water. This silicate it is said is in such a state as to be " usefully applicable for pro- " moting the growth and strength of plants."

[Printed, 4*d*. No Drawings.]

A.D. 1859, May 2.—N° 1101.

GOSSAGE, William.—" Improvements in the manufacture of " caustic soda and carbonate of soda from certain alkaline liquors " and salts." These are, first, " the manufacture of carbonate of " soda from caustic soda contained in or mixed with salts obtained " by the concentration of black ash liquors;" by " exposing such " salts mixed with caustic soda to carbonic acid gas." The crystals are exposed in layers on shelves or floors in a chamber until perfectly carbonated.

Second, manufacturing " caustic soda from such salts obtained " by the concentration of black ash liquors," by " boiling such " salts with water and caustic lime." The second portion of salts obtained from black ash liquors is treated as above which converts the carbonate of soda into caustic soda, this solution being evaporated " until the greater part of the salts previously con- " tained in the solution have become separated therefrom, and " the remaining liquid is sufficiently charged with caustic soda " to become solid on cooling." The salts thus obtained containing much sulphate of soda, in preference, are fluxed with coal and lime so as to obtain carbonate of soda.

Third, manufacturing caustic soda by boiling a solution of soluble glass prepared " by fluxing clean silicious sand with about " its own weight of soda ash containing about fifty-four per cent. " *of real soda,*" *with* caustic lime. The quantity of silicic acid in the solution is ascertained and for every 100 parts so present adding thereto "80 parts of caustic lime previously slaked to a "fine powder by the addition of hot water" and boiling them well together. The silicate of lime precipitated is removed and the solution of caustic soda is concentrated till it solidifies on cooling.

[Printed, 4*d*. No Drawings.]

A.D. 1859, May 2.—N° 1103.

EMERSON, Frederick William.—"Improvements in treating ores to obtain a new metallic substance and its salts, and "in the application of such matters, and also certain products of "tungsten in dyeing, printing, and painting." These are, first, separating a metallic substance which it is proposed "to call "chrolithineum, from the "so called ores of tungsten, such as "wolfram, tungstate of lime, tungstic oxide and others, and the "manufacture and application of its various salts to useful purposes in the arts such as dying textile fabrics, painting on "porcelain and the production of paints and pigments."

Second, the manufacture and application of the so called blue oxide of tungsten as a dyeing substance for textile fabrics and as a paint or pigment.

Third, "the production of paratungstate of alkali, metatungstate of alkali, iso-tungstate of alkali, and polytungstate of "alkali," which may be used as above and the combination of the acids of these salts "with any suitable metallic oxide or mixtures of metallic oxides as a base, such as the oxides of lead, "zinc, barytes, lime, and others to form paints and pigments."

A fair sample of the ore of tungsten is assayed in order to ascertain the quantity of caustic alkali, or alkaline salt, or caustic alkaline earth, or alkaline earthy salt or any mixture of the same, required to decompose the ore to be treated, and the bulk of the ore is mixed with the alkaline material and heated in a retort of iron or fireclay, condensing any vapours; the result is named "salts of the oxides of chrolithineum," and in some cases it is said they may be used as they are and in other cases they are purified.

"To produce the chrolithineum in its metallic form" the "oxide or salt produced as aforesaid or by any other means" is *mixed with a* carbonaceous matter and submitted to a strong *heat in a covered* crucible, or the salt or oxide in a retort or furnace, with or without carbonaceous matter, is heated strongly while "a stream of hydrogen, or carburetted hydrogen, or com-" mon coal gas" is passed over it, or in some cases it is reduced " by means of sodium or potassium." "To produce the blue " oxide of tungsten" a solution of an alkaline salt of tungsten has added to it metallic tin, zinc, or other metallic reducing agent, when acid is added by degrees "until any precipitated " tungstic acid is converted into the blue oxide." In preference this oxide is treated as for the conversion of tungstic acid into the blue oxide as follows:—Tungstic acid or any other acid oxide of tungsten is placed on perforated shelves in a retort, or the retort may be made to rotate or in some way to expose fresh surfaces. The retort is brought to a low red heat and kept so while "a " stream of hydrogen, carburetted hydrogen, or common coal " gas, or carbonic oxide" is passed over or through the material until it is "thoroughly converted into the blue oxide," which "is " very apt to degenerate in color if exposed to atmospheric " influences in a heated state."

"To prepare paratungstate of alkali" the ore is mixed with " caustic or carbonated alkali or alkaline salt;" if sulphate of alkali is used a carbonaceous material is also added, the whole is melted, allowing "an access of atmospheric air; the mass is " allowed to cool, and the soluble tungstate of alkali dissolved " out, and the clear liquid when boiling is treated gradually with " tungstic acid, in preference freshly precipitated," "until the " solution ceases to give a precipitate on the addition of a little " dilute nitric acid;" or tungstate of soda is produced by boiling the ore with causti calkali and converting it into paratungstate of alkali by adding "recently precipitated tungstic acid."

"To prepare metatungstate of alkali" a solution of paratungstate of alkali is boiled for several hours, cooled, and the clear solution decanted off and evaporated to a "syrupy con-" sistency and set aside to crystallize in any convenient " vessel."

"To prepare the isotungstate of alkali" the metatungstate of alkali is boiled with an excess of caustic alkali, evaporated to dryness, and heated to a low red heat in any furnace, and the isotungstate is dissolved out and crystallized.

"To prepare polytungstate of alkali" "tungstic acid obtained " by the action of a strong mineral acid or a mixture of sulphuric " acid and salt on finely powdered wolfram" is digested in a solution of caustic alkali, and when it is saturated it is evaporated very slowly, separating first paratungstate and afterwards isotungstate of alkali; the mother liquor is then evaporated till it assumes a brownish color, when it is left in "quietude for " some time," " until it separates into two distinct layers, one of " which is brown and syrupy;" to this is added boiling hydrochloric acid, which throws down polytungstic acid, which filtered out is digested in caustic alkali, and the solution is evaporated and crystallized.

Some examples of the mode of applying the above substances in dyeing, printing, and painting are given.

[Printed, 6*d*. No Drawings.]

A.D. 1859, May 3.—N° 1107.

CLARK, WILLIAM.—(*A communication from Lalonel de Sourdeval.*)—" Improvements in obtaining or extracting quinine and " the principal organic alkalies." These are in using fatty acids instead of alcohol essences or hydrocarbon oils. " A decoction is " obtained " from the bark " by means of hydrochloric and sul- " phuric acids," an alkali added very slightly in excess, and the whole boiled with a fatty acid, forms a layer on the top which contains the alkaloids. On cooling this solidifies, after which it is boiled with water and treated with acid water for the alkaloids. It will be understood that this improved process is " also " applicable for the extraction of alkalies from opium, morphia, " codéia, &c."

[Printed, 4*d*. No Drawings.]

A.D. 1859, May 4.—N° 1120.

WILLANS, JACOB GEOGHEGAN.—" Improvements in utilizing " bog stuff or peat when applied for treating metals and certain " mineral and alkaline substances." These are, first, mixing the bog stuff or peat in the undried state " with pig or cast iron in a " divided state, also the moulding of the same preparatory to its " being exposed to heat in contact with the said bog stuff or " peat intermixed therewith."

Second, " the collection of tar and other condensible products " given off from bog stuff or peat whilst being used as fuel to " lime kilns."

Third, "the adding to and intermixing with ores of iron pre-" viously broken or pulverized bog stuff or peat" in the undried state; also "the moulding the said mixture preparatory " to its being exposed to heat."

Fourth, "the use of bog stuff or peat" in the undried state for mixing "with sulphate of baryta or sulphate of soda, preparatory " to such sulphates being reduced to sulphurets by the application " of heat." The bog stuff or peat is ground up along with the sulphate of soda and dried "in any convenient manner by heat. " When thoroughly dried the compound is to be calcined and " desulphurized in the same manner as if the usual forms of " carbon had been used."

[Printed, 4*d*. No Drawings.]

A.D. 1859, May 11.—N° 1178.

MANBRÉ, Alexandre.—(*Provisional protection only.*)—" An " improved method of extracting and purifying sugar, called " glucose, and 'sirop de fecule' from potatoes, or fecula, or " starch, or dextrine, for the purposes and uses of brewers, " distillers, vinegar makers, colouring makers, or otherwise." This consists, first, " in the saccharification of a mixture of nine " parts of potatoes, or fecula, or starch, or dextrine, with one " part of flour from rice or maize, together with forty parts of " water," by " the reaction of the diastases," or of malt, or of " sulphuric or any other acid, or by the action of heat."

Second. An apparatus is " charged with the saccharified " liquid, then air or steam or any other agent is introduced over " the mass through a cork provided for the purpose ;" when the saccharified liquid is forced through a filter of " wire gauze, also " layers of burnt bones, charcoal, woollen felt, and flannel " on a perforated false bottom, it is completely purified and it is drawn off and concentrated to " hardness or granulation." " Or instead of introducing any agent from above to force the " saccharified liquid through the filter," a pump or vacuum " may be employed to draw it through it."

[Printed, 4*d*. No Drawings.]

A.D. 1859, May 11.—N° 1179.

MANBRÉ, Alexandre.—(*Provisional protection only.*)—" The " manufacture of a colouring matter for colouring spirits, beers,

" vinegar, and other liquids, from sugar produced from rice, " maize, carrots, maple, ananas pompions, chestnuts, mangel-" wurtzell, sorgho, turnips, and Jerusalem artichokes." This consists in converting into caramel the sugar produced from the above-named substances " by the action of heat."

[Printed, 4*d.* No Drawings.]

A.D. 1859, May 20.—N° 1247.

JOHNSON, John Henry.—(*A communication from Jean François Persoz.*)—" Improvements in the roasting or calcining " of ores, applicable also to the oxidising of other substances." These are, in " roasting or calcining ores " containing sulphur, replacing the chimney in furnaces used for the purpose by " an " exhaust and force pump." " The mixture of air and sul-" phurous acid which leaves the furnace possesses a high degree " of heat," and it is " proposed to pass it, before reaching the " piston of the pump, through suitably arranged chambers or " cavities," by which it is freed from solid particles and cooled down, and the waste heat " may be applied either to the evapo-" ration of liquids, or to the drying of substances generally." Amongst the matters carried off by the gases are arsenious acid, oxide of antimony, and sulphuric acid. The extremities of these chambers or cavities is in " communication with the exhaust and " force pump which removes the gases, and directs them to the " apparatus intended for collecting the sulphurous acid," or for " the manufacture of sulphuric acid, by its ulterior oxidation in " suitable apparatus." The ore is roasted alone or before or after partially roasting it, it may be " mixed with suitable proportions " of sulphuric acid, bisulphates, or sulphates or carbon " and calcined, excluding the air. Any pump " capable of resisting " the action of the gases," and not affected by the heat, still retained by them will do. " A pump having its essential parts " constructed of cast iron and vulcanized india-rubber will be " found to answer admirably."

[Printed, 4*d.* No Drawings.]

A.D. 1859, May 21.—N° 1254.

THOMPSON, John, and THOMPSON, John, the younger.—(*Provisional protection only.*)—" The manufacture of salt by an " *improved* and more economical mode." This consists in conducting the heat necessary for evaporating the brine, by means of "a flue or tube of iron or other suitable material extending "through the body of the salt water or brine, instead of the heat "passing along the outside of the pan as heretofore commonly "practised." "The heat may be either steam, hot water or fire, "which may be either generated in the aforesaid flue or tube, or "otherwise, as may be found most desirable in practice."

[Printed, 4*d*. No Drawings.]

A.D. 1859, June 3.—N° 1361.

WILSON, John.—"Improvements in the manufacture of car-"bonate of soda." These are, first, "the manufacture of sul-"phuret of sodium (for the purpose of converting this into "carbonate of soda by the action of carbonic acid gas thereon) "by decomposing sulphate of soda, either by fluxing such sul-"phate in mixture with sulphate of barytes and coke or coal, or "by causing such sulphate to flow in a state of fusion by heat "through a column of coke or coal at a bright red heat." In this second process, the gases are drawn off from the top of the column, and are brought into the bottom of a vessel filled with siliceous pebbles or other suitable material, the objects of this vessel is to cool the gases, and to render them "capable of being "used to furnish carbonic acid gas, also to arrest any compounds "of soda which may pass over in vapour" from the column.

Second. "The manufacture of bicarbonate of soda (for the "purpose of using such bicarbonate of soda as a source for car-"bonic acid, to be applied for effecting the decomposition of "sulphuret of sodium) by causing a mixture of crystals of car-"bonate of soda, with dry or nearly dry carbonate of soda to "absorb carbonic acid gas."

Third. "The abstraction of sulphur by the use of such oxides "of iron as are in any degree magnetic from sulphuretted hydro-"gen gas, which gas is disengaged when carbonate of soda is "manufactured by the action of carbonic acid on sulphuret of "sodium."

[Printed, 1*s*. Drawing.]

A.D. 1859, June 3.—N° 1370.

ARROTT, Alexander Robertson.—"Improvements in the "manufacture of soda." These are, first, "bringing of the sul-

" phuretted hydrogen as it is evolved in the manufacture of " carbonate of soda in contact with oxide of iron or oxide of " manganese heated to redness," thus producing sulphurets of iron or of manganese which are used for the manufacture of salt cake either by burning them for the production of sulphuric acid, or they are calcined, when mixed with common salt thus forming salt cake and the oxides, from which the salt cake is washed out by water.

Second, "the use of oxide of iron and oxide of manganese " when manufacturing caustic soda," as follows:—The salt cake or sulphate of soda is roasted with coal or coke, the sulphuret of sodium so obtained is "brought into contact with oxide of " iron or manganese in the following manner. A quantity of " peroxide of iron or oxide of manganese is put into a solution " of caustic soda, and the solution is evaporated and heated until " the whole has assumed an "olive yellow colour." Water dissolves out from this mass caustic soda, leaving the oxides "now " in a state to take sulphur from sulphuret of sodium," a solution of sulphuret of sodium is now added "so long as the oxide con- " tinues to take up sulphur, whereby a solution of caustic soda " is produced and sulphuret of iron or sulphuret of manganese " is precipitated." This process is varied by adding the oxides, caustic soda, and solution of sulphuret of sodium together. "In " all these decompositions the oxide employed should be at least " equal to the weight of sulphuret of sodium to be decomposed." Caustic soda is obtained by heating together carbonate of soda and peroxide of iron or manganese to a full red heat, which is continued for two or three hours, and lixiviating the residue.

[Printed, 4*d*. No Drawings.]

A.D. 1859, June 7.—N° 1388.

NATION, **William Bryer.**—"Improvements in the manu- " facture of superphosphate of lime." These are using the following "ingredients and proportions of the same," namely, " 1 ton of coprolites, 1 ton of bone ash, 1 ton of sulphuric acid, " or its equivalent of sulphuric acid gas, one ton of muriatic acid, " or its equivalent of muriatic acid gas." Or using "the follow- " ing phosphate materials, bone ash, bone, animal charcoal, " *coprolites*, &c. with sulphuric acid, and muriatic acid or sul- " *phuric acid* gas and muriatic acid gas;" or "with sulphuric

" acid gas and muriatic acid;" or " with muriatic acid gas and " sulphuric acid," or " with muriatic acid gas, sulphuric acid gas " or muriatic acid singly." The materials are placed on shelves in a chamber and " if necessary moistened with steam or water to " make the gas or gases combine with the phosphate materials," also if necessary the superphosphate of lime is dried in a suitable chamber by hot air at about 150° to 212° F.

The proportions of the ingredients may be varied from the above and also the heat in drying the same.

[Printed, 4*d.* No Drawings.]

A.D. 1859, June 10.—Nº 1406.

GREENSHIELDS, Thomas.—" Improvements in purifying gas " and obtaining ammoniacal and other salts." These are, first, " separating and removing from the gas the ammonia, sulphur, " and carbonic acid, whether combined or uncombined with " other elements," by passing " the gas through 'scrubbers' " supplied with a solution or solutions containing elements that " will decompose or separate the impurities from their combinations." To remove the ammonia and carbonic acid a solution of chloride of barium and of caustic barytes mixed together are employed, " the ammonia will combine with the chlorine, and the " carbonic acid liberated will combine with the barium liberated," forming chloride of ammonium and carbonate of barytes, the caustic barytes will combine with the free carbonic acid. The solution, &c. run from the scrubbers will deposit carbonate of barytes, and the chloride of ammonium is in solution; these are separated and the chloride evaporated and crystallized. " When " the whole of the ammonia and carbonic acid has been removed " the gas is to be passed through the ordinary 'scrubber' or " 'scrubbers,' being supplied" with caustic soda solution to remove the sulphur.

Second, preparing the above solutions for the purpose of removing the impurities from gas, as follows:—Sulphuret of barium is made by heating to redness for some time sulphate of barytes and fine coal or slack in powder mixed together in a retort, and drawn into hot water, on adding muriatic acid to this solution, chloride of barium is obtained and sulphur is precipitated; chloride of barium " of not less than 1.260 gravity is named purifying solution " No 1." When this solution is decomposed by " the am-

" moniacal liquor obtained from the condensers" either by adding the liquor itself or "as giving a purer product, distilling " the ammoniacal liquor" and condensing it "in the chloride of " barium solution," chloride of ammonium is in solution and is decanted off and crystallized and the washed carbonate of barytes is boiled with a certain quantity of sulphate of soda, carbonate of soda is principally in solution and " sulphate and undecomposed " carbonate of barytes precipitate." "If nearly decomposed it is " preferred to complete the decomposition" by "adding anhydrous " caustic baryta prepared by mixing the precipitated carbonate " of barytes with about one-third of its weight of coal or slack in " fine powder, and keeping it "at a bright red heat for rather " more than an hour;" it is preserved in tight vessels or on cooling it is dissolved to make "the purifying solution No. 3 to be " used for depriving gas of carbonic acid." When a solution of chloride of barium is added to the above solution and "no pre- " cipitate forms, the decomposition is complete." "The solution " is then carbonate and caustic soda to be run from off the pre- " cipitate," and the carbonate of soda crystallized, or it "may be " made caustic by well known means and when made of the " specific gravity, 1.125, will be the purifying solution to be called " No. 2 for removing sulphur from the gas." Or this solution may be made by decomposing sulphate of soda with anhydrous caustic baryta prepared as above. The caustic soda solution after having been used to deprive the gas of sulphur is mixed with about one-third of its bulk of sawdust and heated to a dull red for about two hours and when cold dissolved, and "may be made " caustic," and of "the required specific gravity to be the purify- " ing solution No. 2."

[Printed, 4*d*. No Drawings.]

A.D. 1859, June 13.—N° 1427.

SMETS, Jacques Théodore.—(*Provisional protection only.*)—Improvements in the manufacture of vinegar from grain and other vegetable products containing saccharine matter, and from a refuse product obtained in the manufacture of starch; also in apparatuses employed therein. The refuse product is the residuum from "the manufacture of starch, and which is generally " used for feeding cattle," and in which remains from about " twenty to twenty-five per cent. of starch of excellent quality, but

" of too fine a grain to deposit itself spontaneously, and become " detached from the thick particles with which it is mixed;" "after " this has settled four or five days it is submitted to saccharification, either by using malt or simply sulphuric acid in a wooden " vat heated by steam or otherwise." If malt is used they are mashed up together and strained and allowed to remain many hours together, and the result separated into the clear and thick part, and both are fermented, and the alcohol distilled from the thick part and filtered through charcoal is added to the clear liquor, after the fermentation has terminated and the yeast is taken off. If sulphuric acid is used chalk is added to neutralize any acid, and the matters are fermented by yeast, "in all respects " in the same manner to obtain the first liquor or wine." The clear liquor or wine is amalgamated with the "filtered mucus," and allowed to remain from fifteen days to a month. Then the liquor is drawn off and placed in a vessel three-fourths filled with beechwood shavings, "from fifteen days to a month matures and " clarifies itself completely, and is then ready to be placed in the " vinegar vases." These are tuns, in which are beechwood cylinders, forming a sort of cage stuffed with beech shavings; the cage is supported upon wooden axes through the end of the tuns. " The place containing the vessels is to be heated to a tempera- " ture of 75° to 85° F.," and a half turn is given every 12 hours to the cylinder for some days." In the preceding description reference is only made "to the treatment of the refuse product " obtained in the manufacture of starch, as the greatest economy " results from the employment of such product, but the same " processes and apparatuses apply equally to whole grain, rice, " and other saccharine vegetable substances."

[Printed, 4*d*. No Drawings.]

A.D. 1859, June 15.—N° 1436.

MAUMENÉ, Edme Jules, and ROGELET, Victor.—" Using " the 'suint' or the portion soluble in water of the greasy sub- " stance found on the skin and hair of sheep, for the purpose of " manufacturing potash and other products." The wool is placed in tubs and systematically washed; the liquors of sp. gr. 1.1 are evaporated to "the appearance of baked molasses" and distilled, and produce tar, ammoniacal water, and gases. " These products " are applied to the same purposes as those of the same nature " which are obtained from coal." The residue is washed with water, and the solutions are evaporated for the carbonate of potash. "The fatty substances which are found in small quanti-"ties in the warm scouring process" are gathered also.

[Printed, 4*d*. No Drawings.]

A.D. 1859, June 20.—N° 1480.

LAMING, RICHARD.—"Improvements in purifying gas, and in "obtaining and reproducing materials useful for that purpose." These are, first, "the combined use of three or more consecutive "scrubbers for the partial purification of gas whenever they are "fitted and worked as to scrub it finally with a small and inter-"mitting supply of fresh water after the same portion of the gas "has been consecutively scrubbed in each of two scrubbers with "water that has been gradually becoming by such use converted "into ammoniacal washings," and "mixed or not with condensed "gas liquor, or preceded or not by the application of such "liquor to the gas in a separate preliminary scrubber."

Second. "The purification of gas from sulphuretted hydrogen, "either wholly or in part, by any oxide of manganese, made" by "exposing to atmospheric oxygen any hydrated precipitate," "when the said oxide is continually reproduced by the spon-"taneous revivification of the spent material," but "the purifi-"cation of gas by the higher oxides of manganese obtained by "precipitation from combinations wherein they exist as such" is not claimed.

Third. "Making a higher revivifiable oxide of manganese subse-"quently to the precipitation of the metallic preparation." The chloride of manganese known as "still waste" from chlorine manufacture is disacidified by evaporation, and when cold is precipitated by "caustic soda, potash, or lime, or hydrosulphate "of soda, potash, or ammonia," and the precipitate washed is "spread out to the air to pass into the condition of hydrated "sesquioxide, a transformation which is sometimes hastened by "mixing it while in a creamy state with dry sawdust or other "porous material," judged "to be complete when by longer ex-"posure its dark brown color acquires no deeper shade." The transformation might be perfected further, and "in a space of time "inappreciably short by using chlorine." "When sulphate of "*protoxide of* manganese can be obtained as a residuary product "*of any* manufacture, it may be substituted" for the chloride in the above process. "Another way of making revivifiable hydrated " sesquioxide of manganese is by further oxidising the protoxide " precipitated from hydrated carbonate of manganese," by stirring into it a dilute solution of caustic soda or potash, or a sulphide of these alkalies, or "even of a carbonated fixed alkali provided only " that it be other than a bicarbonate." The carbonate of manganese may be mixed "with about half its weight of quicklime " previously slaked, the mixture being damped with water," exposing the mixture to the air, and "the products afterwards " put into the purifiers without separation." "The oxide made " by any of the processes" described in No. 2740, 1858, after purifying gas, becomes "hydrated sulphuret of manganese," and is decomposed "by atmospheric oxygen."

Fourth. "The purification of gas from sulphuretted hydrogen, " either wholly or in part, by mixtures compounded of caustic " lime, or of chalk with native peroxides of iron or manganese."

Fifth. "The purification of gas by any porous mixture of an " artificial and higher oxide of manganese with hydrochlorate of " the same base or of lime, in connection with the spontaneous " reproduction of its purifying energy" by "exposure to the air " in any of the ways known to be useful in the case of hydrated " peroxide of iron."

[Printed, 6*d*. No Drawings.]

A.D. 1859, July 4.—Nº 1586.

SIMON, JOSEPH.—"A composition named zeiodelite, a kind of " paste which becomes as hard as stone, is unchangeable by the " air, and being proof against the action of acids, may replace " lead and other substances for various uses." This "is formed " from a paste composed of sulphur, and a powder more or less " fine obtained from substances proof against the action of acids " in general, and in preference from the burnt stoneware of broken " jars or demijans, which have been manufactured to contain " acids" or "pulverized cristals or broken glass," in certain proportions. This material is used for sulphuric acid chambers in which case it is stated besides being cheaper, &c., it will enable " the operator to obtain a pure acid, free from admixture with " nitrate or sulphate of lead."

[Printed, 4*d*. No Drawings.]

A.D. 1859, July 20.—N° 1708.

ORIOLI, Zephirin Gaspard Alexandre Nathan Petrone.—"New applications of hypochloride of alumina to bleaching " and dyeing, and to the disinfection and preservation of organic " matters." This new agent exists only in solution in water, and is obtained by a double decomposition of hypochloride of lime and sulphate of alumina in equal quantities. By mixing solutions of these two salts a chemical action is produced, forming instantaneously sulphate of lime, and also producing hypochloride of alumina. In common with chlorine and hypochlorite of lime, with the addition of an acid, this salt acts very rapidly on all coloring matters of organic origin, but it has the advantage over these agents of remaining entirely neutral during the period of action. Thus, fabrics in which hypochlorite of alumina is used as a decoloring salt, will not become brown after bleaching. "As regards " paper pulp, a simple washing operation occupying half an hour " is all that is necessary for eliminating the colouring matter, " which is rendered soluble by the bleaching."

Thread or cloth is bleached by being washed in lye and plunged in a bath containing 2 lbs. of hypochlorite of alumina for every 100 lbs. of bleaching material.

The salt may also be very advantageously substituted for acetate of alumina as a mordant for dyeing, as it contains no trace of iron.

In the manufacture of printed calicoes, &c., hypochloride of alumina thickened with gum, dextrine, &c. may also be used as a mordant for printing, the stuff being previously submitted to heat for the purpose of removing the hypochlorous acid.

The salt may also be applied to the preservation of animal matters, anatomical preparations, and embalming bodies, &c.

[Printed, 4*d*. No Drawings.]

A.D. 1859, August 8.—N° 1825.

McCALL, Robert.—(*Provisional protection refused.*)—"Dis- " engaging and abstracting minerals, especially copper from " mineral waters, more particularly from water drawn from or " issuing out of copper or sulphuric mines, and for precipitat- " ing or depositing such minerals in such waters." This consists in adding to or mixing "a certain proportion of pulverized grey " or white magnetic ore of iron with the mineral waters which

" issue or are drawn from copper and sulphur mines and other " sulphuric waters," by which means the copper precipitates and collecting at the bottom, at convenient times the water is let run out into a reservoir and the precipitate of copper is then "re- " moved and exposed to the action of the sun and atmosphere to " dry it, which completes the process and renders the copper fit " for market." "The residuum or remaining mineral substances " are carried by the water into a reservoir where they form into " yellow ochre, which is also precipitated or deposited in the " bottom."

[Printed, 4d. No Drawings.]

A.D. 1859, August 8.—Nº 1826.

OLLIVIER, Louis Bertrand.—" Improvements in closing or " stoppering bottles, jars, and other receptacles." These are, " forming two holes diametrically opposite to each other in the " neck of the bottle or other vessel. After the cork or stopper is " placed in position a nail, pin, or other rod is forced through it, " of a kind suitable to pass through the cork or stopper and " bottle neck." The object is to secure gaseous liquids, acids drugs, &c.

[Printed, 6d. Drawing.]

A.D. 1859, August 9.—Nº 1843.

BRYANT, John Dyer.—" Improved superphosphate of lime." This consists first, in crushing the raw material and heating it so as to convert the carbonate into pure lime which is washed away by water.

Second. Grinding the raw materials, heating them, and without exposure to air washing them with water; " by drying the re- " siduum obtained by either of the methods herein-before described " and repeating the said operations of heating and washing, a " further quantity of the said lime may be discharged from the " said materials."

[Printed, 4d. No Drawings.]

A.D. 1859, August 17.—Nº 1893.

MEDLOCK, Henry.—" Improvements in Portland and Roman " cement, lime, and other similar kilns or furnaces." These are said to be, "the burning or oxidation of the noxious and delete-

" rious gases or vapours produced in the kiln or furnace, so as to " render all but the sulphurous acid in a gaseous state innoxious " as afterwards described, and " the making use of the heat produced " by the said burning or oxidation to heat the drying floor, and " the combination of the gaseous sulphurous acid with water so " as to prevent its escape into the air." This is effected by conducting " all the products of combustion from the kiln or furnace " through a pipe or flue to a small furnace containing ignited " coke. By means of a fan or blower a certain quantity of air is " forced into the pipe or flue before it reaches the coke furnace, " and by the draught so produced the products of the combus- " tion mixed with air are forced into the coke furnace impinging " on the ignited coke are burned." By this means the sulphur or sulphuretted hydrogen are converted into sulphurous acid, the carbonic oxide into carbonic acid, &c. The flue or pipe is continued under the drying floor, and beyond the drying floor it passes " into a chamber containing a perforated tray on which " coke or other porous substance is placed," and kept moist by a stream of water so as to condense the sulphurous acid, the solution of which may, if necessary, be allowed to flow away by an opening at the bottom of the chamber, which may " if necessary " be trapped to prevent the escape of any sulphurous acid by that " way."

[Printed, 10*d*. Drawing.]

A.D. 1859, September 5.—N° 2022.

BAKEWELL, Frederick Collier.—(*A communication from Henry Pemberton.*)—" Improvements in the manufacture of caustic " alkalies." These are, " separating caustic alkalies from the " lime or other precipitate used in the process of their manufac- " ture, by means of filtration through fire-bricks or other solid " porous substance capable of resisting the caustic action of the " alkaline liquid."

[Printed, 6*d*. Drawing.]

A.D. 1859, September 5.—N° 2023.

BUSH, William.—(*Provisional protection only.*)—" Manufactur- " ing granulated seidlitz powder." " Granulating the seidlitz " powder while in a partial state of fusion."

[Printed, 4*d*. No Drawings.]

A.D. 1859, September 16.—Nº 2110.

RICHARDSON, Thomas.—"Improvements in the manufac-"ture of sulphuric acid, and in applying the heat generated in "the process." These are, "employing the heat evolved when "burning metallic sulphurets, such as pyrites or blende in lumps "or large pieces in this manufacture, to promote and assist the "combustion of similar sulphurets in a state of powder more or "less fine; also for concentrating sulphuric acid by surface "evaporation, raising steam in ordinary boilers, and evaporating "liquors, or digesting solid substances in suitable vessels placed "on the top of the furnaces."

[Printed, 1*s.* 8*d.* Drawings.]

A.D. 1859, September 20.—Nº 2137.

MANBRÉ, Alexandre.—(*Provisional protection only.*)—"The "manufacture of a coloring matter for coloring spirits, beers, "vinegar, and other liquids and beverages." This consists as follows, "rice, maize, ananas, pompions, chesnuts, mangel "wurtzell, sorgho, turnips, and Jerusalem artichokes," yield a sugar which, when "burnt until it has lost all its sweetness or "flavour of sugar," is the coloring matter in the solid state, and may be boiled up with water.

[Printed, 4*d.* No Drawings.]

A.D. 1859, September 20.—Nº 2138.

MANBRÉ, Alexandre.—"An improved method of extracting "and purifying sugar called glucose and 'syrup de fecule' from "potatoes, or fecula, or starch, or dextrine," for the use of brewers, distillers, vinegar makers, &c. These are, "in the saccharification "of a mixture composed of nine parts of potatoes, or fecula, or "starch, or dextrine, with one part of flour from rice or maize, "together with forty parts of water in which has been diluted "diastases or germinated barley called malt," in the proportion of, "by weight, about one part of diastases for one thousand parts "of the mixture, or from twenty to twenty-five parts of malt for "one hundred parts of the mixture, or from one to two parts of "sulphuric acid for one hundred parts of the mixture;" but these proportions may vary. After the fecula or starch is converted into sugar by boiling with the acid, the acid is neutralized by carbonate of lime, *and the liquid* decanted from the sulphate of lime, and lime water, burnt bones, and bullocks' blood is added, and the whole brought "within a few degrees of the heat of boiling "water, which heat is maintained until the impurities are coagulated and collected on the surface," whence they are skimmed off and the liquid filtered through burnt bones, and treated with a fresh quantity of burnt bones, blood, milk of lime, and bisulphite of lime; the precipitate removed the solution "is conveyed "again through a burnt bone filter," and the sulphate of lime decomposed by oxalate of ammonia and the whole filtered. The filtering apparatus used is capable of being hermetically closed and furnished with a perforated false bottom on which are the bones, &c.; air or steam, &c. is forced in at the top when the saccharified liquid is forced through the filter, "or a pump or "vacuum may be employed to draw it through it."

[Printed, 4*d*. No Drawings.]

A.D. 1859, September 22.—N° 2157.

DALES, JOHN.—"Improvements in purifying sewage and other "impure waters, and in separating therefrom materials suitable "for use as manure, and also the preparation of a substance to "be employed for such purposes." These are, in reference to this subject, first, employing a material to which he has "applied the "name of magneto-chloride of iron," prepared by dissolving in muriatic acid "magnetic oxide of iron or any of those ferruginous "products from various metallurgical processes and manufactures "which are magnetic, or will furnish when dissolved in muriatic "acid a solution, which when diluted and mixed with solutions "of ferrocyanide and ferridcyanide of potassium will produce in "each case a blue precipitate." It is advisable to use the muriatic acid of the commercial strength, when the acid is nearly saturated, the fluid should be about 1·450 at 60° F., and contains about one pound of iron in the gallon. By careful evaporation it may be obtained in the solid form and then can be dissolved by water.

Second, employing the compound named "chloride of manga-"nese prepared by dissolving in muriatic acid any of the com-"mercial oxides of manganese." "The process is similar to that "ordinarily adopted by manufacturers for the production of "chlorine." The liquid is concentrated to about 1·450; this is employed "either alone, or, by preference, mixed with an equal "*volume of* a solution of perchloride of iron of like density." "*For the* purification of offensive stagnant waters," from thirty to seventy gallons are employed to "each million gallons of foul "water."

[Printed, 4*d*. No Drawings.]

A.D. 1859, October 5.—N° 2251.

THOMPSON, John, and THOMPSON, John, the younger.— "The manufacture of salt by an improved and more economical "mode." In manufacturing salt using "a flue or tube of iron, "or other suitable material, extending through the body of the "salt water or brine, instead of the heat passing along the outside "of the pan as heretofore commonly practised. The heat em-"ployed may be either steam, hot water, or fire, which may be "generated in the aforesaid flue or tube, or otherwise, as may be "found desirable in practice," the object being to expose "the "entire surface of the flue or flues, tube or tubes, or conduits of "heat in the salt water or brine."

[Printed, 4*d*. No Drawings.]

A.D. 1859, October 5.—N° 2254.

HERBERT, Jane Ann.—(*A communication from Ludwig Brumleu.*)—(*Provisional protection only.*)—"Manufacture of oxychlo-"ride of lead." This consists in "saturating acetic acid with "lead" and precipitating "therefrom the lead by muriatic acid, "forming thereby chloride of lead, the acetic acid becoming fre "to be used again for dissolving lead in excess, so that the sub-"acetate of lead is formed, which being brought in contact with "the chloride of lead will be reduced to acetate of lead, giving "the excess of lead to the chloride of lead, and forming thereby "sub or oxychloride of lead and acetate of lead."

[Printed, 4*d*. No Drawings.]

A.D. 1859, October 10.—N° 2303.

PARKER, Samuel Brewster.—(*Provisional protection only.*) —"A method of and apparatus for revivifying oxide of iron and "other agents for purifying gas containing metallic particles." This consists "of a circular pan closed at bottom and open to "the atmosphere, in the centre of which a shaft carrying inclined "blades or agitators is set, and is provided with gear in order "that rapid rotary motion may be imparted thereto."

[Printed, 4*d*. No Drawings.]

A.D. 1859, October 17.—N° 2367.

NEWTON, William Edward.—(*A communication from Vincent Marie Féraud, Leonard Laureau, and Felix Richard.*)—"Improve-"ments in preserving and disinfecting organic substances." These are "effected by submitting the substance to be operated "upon to the action of some convenient hydrocarbon," employing "heavy hydrocarbons and oils extracted from mineral or vegetable "pitch or tar naphtha, bitumen, asphaltes, resins, balms, and other "analogous carbonaceous matters. These hydrocarbons in the "proportion of 5 per cent. or even less, possess the property of "preventing organic matters either of animal or vegetable origin "from putrifying;" they also preserve "organic matters for any "length of time, and by preventing fermentation in fresh sub-"stances they will arrest decomposition when the articles operated "upon had already undergone a change." "The hydrocarbons "which have the greatest preserving properties are those distilled "under 150° centigrade." This preserving process it is said is applicable to "all organic matters without interfering in any way "with their various uses in the arts, manufactures, and agricul-"ture," and among a great number of organic matters named is "blood, whether employed for the extraction of albumen, or for "the preparation of prussiates and of Prussian blue;" and it is also stated that "in case the smell of the hydrocarbons should be "objectionable at the time the matters preserved are required "to be employed, this may be removed by treating them with "sulphuret of carbon, and which is also claimed as part of this "invention."

[Printed, 4*d*. No Drawings.]

A.D. 1859, October 19.—N° 2391.

SPENCER, Thomas.—(*Provisional protection only.*)—"Improve-"ments in the manufacture of carbonate of soda." These are, "in the absorption of sulphuretted hydrogen gas so liberated in "the manufacture of carbonate of soda by means of oxide of iron "or oxide of manganese, thereby producing a compound con-"taining sulphur, from which such sulphur can be liberated "either by distillation or combustion, and applied to the produc-"tion of sulphuric acid, suitable to be used for the preparation "of a farther quantity of sulphate of sodium." The oxides of iron or manganese may vary; "the same oxides are available "when in natural or artificial combination with carbonic acid or "carbon alone, and also when in combination with earthy matters "as ores."

[Printed, 4*d*. No Drawings.]

A.D. 1859, October 22.—N° 2422.

WRIGHTSON, Francis.—(*Provisional protection only.*)—"Improvements in purifying coal gas and in utilizing compounds "obtained in purifying coal gas." In purifying gas the ammonia and sulphuretted hydrogen contained in it are absorbed by means of persalt of iron mixed with the solid matter of such sewage as contains sulphuret of iron and carbonaceous matter, in addition to other porous matter, such as sawdust. Ammonia is absorbed from the gas by the use of gypsum, dissolved or partly dissolved in sulphuric acid; "also by the use of phosphate of lime, sulphuric acid, and sulphate of magnesia combined, whereby the "ammonia phosphate of magnesia, valuable as a manure, is "obtained. I also use for absorbing the ammonia gelatinous "silicic acid alone or in combination. I obtain gelatinous silicic "acid and hydrated sulphate of lime from the slag of blast "furnaces by the action of mineral acids; and I obtain hydrated "sulphate of lime by the action of sulphuric acid upon alkali "waste. In utilizing compounds obtained in purifying gas, I "distil sulphur from the residue product obtained in the said "purification, called ochre waste. I afterwards treat the residuum "with mineral acid, adding peroxide of manganese to peroxidize "the iron when necessary. I thereby obtain persalt of iron to be "used in gas purifying. After use the ammoniacal salts are "extracted by means of water, and the residuum is boiled with "milk of lime. Peroxide of iron is thereby obtained in the solid "form, and the cyanogen compounds in solution. The peroxide "of iron is in a suitable state for purifying gas."

[Printed, 4*d*. No Drawings.]

A.D. 1859, November 11.—N° 2564.

BROOMAN, Richard Archibald.—(*A communication from Demangeot & Co.*)—"The preparation of a salt, and means of "combining, mixing, or applying the same to render fabrics, "pulp, wood, oil, and other substances uninflammable." These are, first, "the preparation of an uninflammable salt." "The " preparation of the salt comprises the purification of sulphate of " ammonia of commerce, and its combination with other agents " hereafter mentioned. The sulphate of ammonia is placed in a " reverberatory furnace, heated to a high red heat, and kept there " about two hours (with stirring); all the organic matters are de-" stroyed, and sulphuretted hydrogen is evolved;" "the contents " of the furnace are withdrawn and allowed to cool." About 200 lbs. of chloride of calcium are placed in a boiler, then "200 lbs. of " raw acetate of lime (this acetate is treated with pyroligneous " acids, and used in a state of paste), and 50 lbs. of the purified " sulphate of ammonia prepared as above," and the whole " dissolved in water heated to about 140° F.," and the water evaporated; "a crystalline deposit then remains. The crystals " are removed and placed in a reverberatory furnace heated to a " dull red, where they are stirred. This salt, on being withdrawn " from the furnace, is the salt which forms the basis of all my " operations for rendering matters uninflammable."

Second. "The combining, mixing, and applying of the said " salt with other substances, in order to render fabrics, pulp, " wood, oil, tar, and other substances uninflammable."

[Printed, 4*d*. No Drawings.]

A.D. 1859, November 14.—N° 2580.

ARROTT, Alexander Robertson.—(*Provisional protection only.*)—" Improvements in the manufacture of carbonate of soda." These are, fusing salt cake with a larger portion of bituminous coal " than is generally usual, by which an open porous coke-like pro-" duct is obtained, consisting of coke and sulphuret of sodium, " which is broken up into small lumps and moistened; carbonic " acid gas is then applied, and the carbonate of soda produced is " dissolved out and boiled down."

[Printed, 4*d*. No Drawings.]

A.D. 1859, November 15.—N° 2595.

GRAHAM, James.—" Improvements in treating and applying " products obtained when galvanizing iron." These are, employing the refuse made by galvinizers " termed sal ammoniac dross " or sal ammoniac skimmings." This refuse is broken up very small, boiled in water, and the solution evaporated is used for boiling the articles to be coated. When the articles are oxidated or covered with scales it is better to take them " out of the boiling " vessels after about ½ an hour, and rub off the scales or oxide, " using a little sand;" washing off the sand and plunging them " into the boiling solution for a short time, when they are in a " fit state to receive the coating of metal." The employment of " muriatic acid is entirely dispensed with." "The refuse left after " dissolving out as much of the salts as practicable" is transferred to a reverberatory furnace, so as to obtain "a very good " oxide of zinc."

[Printed, 4*d*. No Drawings.]

A.D. 1859, November 16.—N° 2596.

GREEN, Charles.—(*Provisional protection only.*)—"Improve" ments in the method of applying heat in the manufacture and " drying of salt." This consists in "burning of gas under the " pans in which the salt is manufactured, instead of by coal fires " as at present, and drying the salt when manufactured by means " of heat or hot air produced by the burning of gas, instead of by " flues from the fires carried through the drying places as at " present."

[Printed, 4*d*. No Drawings.]

A.D. 1859, November 17.—N° 2607.

LAMING, Richard.—"Improvements in obtaining alkalies and " alkaline compounds." These are, first, "making carbonate of " soda by forcing into or through a solid mass containing sul" phuret of sodium, a current of carbonic acid gas, with or " without other accompanying elastic matters that permit of the " formation of the fixed alkaline carbonate."

Second. "Making simultaneously hydrosulphate of ammonia " and carbonate of soda by forcing into or through a solid mass " containing sulphuret of sodium a current of elastic matters that " permit of the formation of the two alkaline compounds, car" bonic acid and ammonia also being present either in the solid or " in the current passing through it."

Third. "Making free ammonia by the distillation of gas liquor " or gas washings, or similar liquors, and causing it with the " carbonic acid and sulphuretted hydrogen, which the liquor " gives off, to pass in an elastic current accompanied by a little

" vapour of water, through sulphuret of sodium, and afterwards
" through a revivifiable oxide of iron or manganese."

Fourth. "Making solution of ammonia eliminated by distilla-
" tion from gas liquor or gas washings or similar liquors, or by
" decomposing a mixed solid mass containing sulphuret of
" sodium, ammonia and carbonic acid being present, by absorb-
" ing it, after it has been freed by any known means from accom-
" panying sulphuretted hydrogen and carbonic acid, into a stream
" of water flowing or falling in contact with it, and in an oppo-
" site direction."

Fifth. "The application in the decomposition of sulphuret
" of sodium into carbonate of soda by a current of carbonic acid,
" of artificial hydrated sulphuret of iron to remove accompanying
" oxygen gas from the carbonic acid itself, or from any gaseous
" substance mixed or to be mixed with it for use."

Sixth. "Making carbonate of ammonia solid or in solution by
" causing a current of hydrosulphate of ammonia, or of mixed
" carbonic acid and ammonia gases, to decompose red hot car-
" bonate of lime, or carbonates of lime and magnesia, and by
" receiving the volatile products of the decomposition into suitable
" condensing apparatus."

Seventh. "Obtaining impure solution of carbonate of am-
" monia by scrubbing or washing impure coal gas lastly with
" pure water, firstly with the product of that water washing, and
" intermediately with either the joint products of the last and
" first water washings subsequently to their desulphuration either
" wholly or in part, after being mixed with the raw ammoniacal
" or gas liquor from the condensers and mains, or with water
" containing unsaturated ammonia from other sources."

[Printed, 6*d*. No Drawings.]

A.D. 1859, November 18.—N° 2612.

GOSSAGE, WILLIAM.—"Improvements in the manufacture of
" carbonate of soda." These are, first, "causing sulphate of
" soda to be decomposed into sulphide of sodium by the action
" of carbon," at a temperature "insufficient to flux the mixture
" of sulphate of soda and carbon employed, and converting the
" sulphide of sodium so obtained into carbonate of soda by the
" action of carbonic acid; also the use of carbonic acid obtained
" by such decomposition of sulphate of soda for the production

" of carbonate of soda." The sulphate of soda in powder is mixed "with about half its weight of small coal, or one-third its " weight of ground coke," and is heated as above in what "is " known to soda manufacturers as a blind furnace," with raking until on testing "all or nearly all the sulphate of soda has become " decomposed," the charge is then withdrawn as quickly as possible, excluding air. The carbonic acid gas produced is withdrawn by means of an air pump or centrefugal fan, or by other suitable means, and secured for use. The sulphide of sodium in powder or in solution is decomposed by carbonic acid gas, bicarbonate or sesquicarbonate of soda producing carbonate of soda, liberating sulphuretted hydrogen gas.

Second. "The manufacture of carbonate of soda by the con" joined action of oxide of iron and carbonic acid or sulphide " of sodium," however obtained. The sulphide of sodium solution is mixed with oxide of iron, and carbonic acid is injected into the mixture "by means of a force pump," or sulphide of sodium is "decomposed by bicarbonate or sesquicarbonate of soda in the " presence of oxide of iron." Sulphide of iron precipitates.

Third. Using such sulphide of iron for the production "of " sulphate of soda to be used for manufacturing carbonate of " soda," by either drying and burning it for the production of sulphuric acid or by fluxing it with common salt with access of air.

[Printed, 4*d*. No Drawings.]

A.D. 1859, November 25.—N° 2668.

CARR, Thomas.—"Improvements in the arrangements and " mechanism for drying glue, moulded clay, sugar, white lead, " and various other substances and articles of manufacture." These are, first, "the combination of a fan or series of fans" constructed on the following principle, "with a chamber or chambers " for drying purposes." A long square chamber is constructed, " open at each end, in which the materials to be dried are placed " with suitable intervals between them for the free passage of the " air." "On a horizontal axle a fan consisting of two or more " radiating arms or blades, set at right angles with their plane " of rotation, and very similar in form and construction to th " sails or vanes of the ordinary windmill," is placed. This fan rotates by any convenient motive power in a circle "equal or

" nearly so to the breadth or depth of the square chamber oppo-" site to the end of which the face of the fan is placed." "When " the chamber is so long, and the obstructions of the air con-" siderable," "another or more similar fans" are made use of " to maintain the current, which may be mounted at regular " distances down the chamber on the same axis as that of the " first, lengthened for the purpose."

Second. "The system or method of drying articles or sub-" stances in chambers by causing the major part of a current of " air artificially heated and set in motion by mechanical means to " keep continuously circulating through the said chambers," as follows:—By adding one or more chambers "placed alongside " the former and communicating with it at both ends," and causing the currents of air generated by any mechanical means, but preferring the fan as above, to "pass up one chamber and " return down the other in constant circulation, until the tempe-" rature is raised by its frequently passing over any suitable " heating apparatus placed within the chambers." There are dampers and valves "in order to regulate the temperature and " change the air."

[Printed, 8*d*. Drawing.]

A.D. 1859, November 29.—N° 2702.

RICHARDSON, Thomas. — (*Provisional protection only.*) — " Improvements in the manufacture of certain compounds of " soda and potash." These are, decomposing "nitrite (nitrate?) " of soda by means of pot ashes or pearl ashes, thus producing a " mixture of nitrite (nitrate?) of potash (saltpetre) and soda com-" pounds." "From the solution containing this mixture portions " of nitrite of potash are separated by repeated crystallizations, " and afterwards from the same liquor a farther crop of crystals " is obtained consisting partly of nitrite (nitrate?) of potash and " partly of carbonate of soda." "These crystals are redissolved " and the soda rendered caustic by lime. The saltpetre is then " separated" "by further crystallizations," and the liquor boiled down "to obtain caustic soda."

[Printed, 4*d*. No Drawings.]

A.D. 1859, November 30.—N° 2713.

FIRMIN, George Jordan. —" Improvements in the manu-" *facture of* tartaric and citric acids and certain salts in connec-

" tion therewith." These are, employing at different stages of the processes in the above manufacture " a filter consisting of a " bed or layer of some finely divided and insoluble material " through which the liquids to be filtered are forced by forming " a vacuum under the filter bed and allowing the pressure of the " air to exert itself on the surface of the liquid above, or the " pressure may be obtained by closing the filter vessel at the top " and forcing the liquid into this vessel by a pump, or air may be " forced into the vessel, or pressure may be obtained by means of " a head of liquid." The filter bed may be made of sand, but " other finely divided and insoluble matters may be employed, " as, for example, the sulphate of baryta," and indeed is preferred. " When a precipitate of tartrate or citrate of lime or " other insoluble tartrate or citrate has been obtained by any " process " and requires to be washed this filter is employed. When any of these salts of lime are decomposed by sulphuric acid the precipitated sulphate of lime is separated on the above filter, &c. &c.

[Printed, 10*d*. Drawing.]

A.D. 1859, December 10.—N° 2808.

BELL, Isaac Lowthian.—" Improvements in the manufacture " of the sulphate of magnesia." These are, forming sulphite of magnesia and afterwards converting it into sulphate of magnesia as follows:—The magnesian limestone is calcined as in lime burning, and washed repeatedly with water, and the residue stirred up with water, and the mixture lifted by a pump is poured in at the top of a tower filled with coke or pebbles and trickles down through these matters, while a current of sulphurous acid gas is made to ascend the tower. Usually several of such towers are employed, and " the mixture of mineral and water is intro- " duced at the top of the first of the series, and from the bottom " of this condenser it is lifted to the top of the second, and so " on." The liquid running from the last condenser should contain an excess of sulphurous acid. " The liquid will then " contain sulphite of magnesia," some sulphate, " a trace of " sulphite of iron, and free sulphurous acid all in solution, also " some insoluble sulphite of lime suspended in it." This latter is first separated; " magnesia added precipitates the iron as oxide;"

the liquid is evaporated, during which "the sulphite of magnesia " passes into sulphate by the absorption of oxygen from the air." When magnesian limestone is employed "without previous cal- " cination and washing it is reduced to powder, mixed with " water, and at once passed through the condensers." Although " the use of condensers to cause the gas to be taken up by the " mixture of magnesian mineral and water" is preferred, "the " gas may be forced by a pump or otherwise to bubble through " the liquid," or " sulphate of magnesia may also be obtained by " passing a current of sulphurous acid gas over magnesian lime- " stone," levigating the mass and evaporating the solution.

[Printed, 4*d*. No Drawings.]

A.D. 1859, December 17.—N° 2871.

HILLS, Frank Clarke.—" Improvements in means and appa- " ratus for purifying gas, and in the preparation and treatment " of oxides of iron to be used in such purification or for other " purposes." These are, first, "the adaptation or combination " of means and apparatus for the purification of gas by the aid " of oxide of iron," as follows :—In N° 13,912 it was proposed to mix atmospheric air with the gas as it entered the purifier "for " the purpose of renovating the said oxide material, at the same " time that the oxide purified the gas," but "the deposition of " sulphur among its particles clogged the oxide," and the object of this "improvement is to prevent such clogging." To effect this, in preference the gas is caused to pass downwards through the material, taking care that no tarry matter comes forward with the gas. The purifiers are circular, similar to those used for dry lime; a vertical shaft or spindle is placed in the centre of each purifier furnished with one or more horizontal arms or stirrers of different forms.

Second, " renovating oxide of iron used in the purification of " gas or for other purposes," as follows:—The material to be oxidized or renovated is admitted into a tube (which is caused to revolve) by means of a hopper, about half or two-thirds full for its whole length. A current of air "is caused to pass through " the tube to oxidize the iron, which air may afterwards be passed " through a condenser to condense any ammonia which may have " been carried off," and thence over a fire. Steam may be admitted into the oxidizing tube to keep up a proper heat. The oxidizing tube is placed at such an incline so that the material regulated into it is oxidated in its passage through it. Instead of the tube rotating a rotating shaft may be placed in the tube.

Third, "obtaining hydrated oxides of iron," as follows:—Cast-iron borings or turnings are ground and sifted, and the fine portions are "wetted with a very weak solution of sulphuric or "muriatic, or nitric, or acetic acid, preferably hot," or wetted "with a solution of hydrosulphuret of lime or hydrosulphuret of "soda," or with water, sulphur, and a little sal ammoniac, and made into heaps so as to moderately heat and oxidize; it should be occasionally stirred or turned over until it becomes cool, when it is damped, as at first, and treated similarly. When "a considerable quantity of oxide of iron is formed it is washed off for "use, and the unoxidized iron may be reground, and the same "process as just described may be repeated." Instead of oxidizing the iron as above "it may be damped in any convenient way in "the oxidizing tube."

[Printed, 1s. 4d. Drawings.]

A.D. 1859, December 20.—N° 2900.

HENDERSON, WILLIAM.—"Improvements in treating certain "ores and alloys, and in obtaining products therefrom." These are, extracting "copper, zinc, silver, cobalt, and several other "metals from their ores by means of sulphuric acid;" "obtaining "oxide of copper, oxide of zinc, and other analogous metals from "the anhydrous sulphates of zinc, copper, and other metals;" "obtaining metallic copper, lead, zinc, or other analogous metals "from their dried suphates;" "obtaining, recovering, or reproducing the sulphuric acid contained in the dried sulphates;" separating "silver, cobalt, and other metals from copper, zinc, "and other metals;" separating "copper, silver, and all other "metals whose chlorides are more or less volatile;" and separating "metals from each other whose chlorides volatilize at "degrees of heat far removed," as follows:—"The first class of "ores are treated in the following manner:—"When a large pro-"portion of red or suboxide of copper exists in the ore it should "be reduced to a coarse powder, and heated red hot" in an open furnace until it is converted into black oxide. When the ore contains only a small proportion of suboxide, or when the calcination is inconvenient, sulphuric acid containing nitrous or nitric acid is employed; or the ore may be treated with sulphuric acid, and the remaining suboxide extracted "by dressing or washing with water " as is well understood." "If the ores contain no suboxide or " sulphuret of copper," they need no preliminary preparation but " are introduced into vats with false bottoms, covered with dilute " sulphuric acid, which is repeatedly passed through the ore until " it is saturated." The solutions of sulphuret of copper or other metal are concentrated "without salting," run into a furnace and dried, or the solutions may be crystallized and the salt dried at 320° to 380° F. The dry sulphate of copper distilled in a retort, sulphuric acid passes off and is conveyed into a leaden chamber. If organic matter or protosulphate of iron is in the mass sulphurous acid comes off, and will require nitric acid gas to convet it into sulphuric acid. The residue is oxide of copper, which, when mixed with carbonaceous matter and siliceous ore, free from sulphur and smelted, yields rough copper fit for refining. "To produce metallic " copper direct from the anhydrous sulphate," and " recover all " or nearly all the sulphuric acid," anhydrous sulphate in powder is mixed with 20 per cent. carbonaceous matter, charcoal in powder preferred, and distilled gradually in close vessels, regulating the heat and conducting the gases evolved (a mixture of carbonic and sulphurous acid) into pipes connected with a vitriol chamber, into which the gases pass mixed with nitrous gas, &c., as in manufacturing sulphuric acid.

"When the copper or other ore contains silver, cobalt, nickel, " or manganese," dissolvable by dilute sulphuric acid, by calcining the dry sulphate at a bright red heat, and washing with hot water, " the undecomposed sulphates of these metals will be dissolved " out and separated from the oxide of copper." When only cobalt exists in the copper ore, the sulphate solutions are concentrated " as far as possible without salting," and the sulphate of copper crystallized out. "The mother liquor contains the sul- " phate of cobalt," which, with the washings from the crystals of the sulphate of copper, is evaporated to dryness and heated red hot; the sulphuric acid evolved is condensed and the residue boiled with water, sulphate of cobalt dissolves out and is "pre- " cipitated by an alkali." "When peroxide of cobalt" is "present " in the ore, it is not dissolved by dilute sulphuric acid." It is recovered " from the insoluble residue by treating it with concen-

" trated muriatic acid," and the cobalt is precipitated "by an " alkali or alkaline earth." Chloride of silver in this residue is washed out by a hot saturated solution of common salt containing advantageously a small quantity of "hyposulphite of " soda or lime." The silver is precipitated from this solution by plates of copper, iron, or zinc. "When an ore contains only oxides " and salts of metals, with no sulphurets, and which also contains " silver," the silver is first dissolved out by common salt as above, and the extraction of the copper or other metal proceeded with as above. The silver is obtained from the solution of salt by "sul- " phide of sodium, avoiding any excess." "The brine can thus " be used again." "The sulphurets of copper, zinc, and several " other metals when thoroughly calcined," are dissolved in dilute sulphuric acid, and the crystals dried, and "either the oxide or " metal" and the sulphuric acid are obtained. "The second class " of ores" are treated as follows :—If the sulphur "is more than 1½ " times as much as the metal or metals to be extracted, it should be " reduced to at least that amount by calcination, or if the ore " contains much silica, the proportion of sulphur may be even " lower than equal proportions." The ores in fine powder, and " mixed with from 5 to 50 per cent. of common salt," are distilled with care as to heat "in retorts or close calcining furnaces, " having flues" and a condensing apparatus attached, in which are condensed by water "volatilized chlorides." The residue in the retort is treated "with the hot acid solution that runs from the " tower or condensing apparatus," and the copper, &c., precipitated from these solutions "with iron, lime, or an alkali, and the " sulphate of soda may be afterwards obtained by evaporation " and crystallization." "When a mixed ore is under treatment," containing chlorides which "volatilize at different temperatures " far removed, such as copper and tin, copper or zinc, and arsenic, " lead, and antimony," employing "a furnace with two or more " beds, all heated by the same fire or fires, each bed having a " separate condenser." "The third class of ores" are treated exactly as the second class, the silica taking the place of the sulphur, and "decomposing the salt at a red heat." When an ore is deficient in sulphur, as burnt pyrites, &c., "the addition of 5 to " 10 per cent. of a strongly siliceous ore very much assists and " hastens the decomposition." "The proportion of salt to be " used very much depends upon the composition of the ores."

[Printed, 6*d*. No Drawings.]

A.D. 1859, December 22.—N° 2918. (* *)

NEWTON, Alfred Vincent.—(*A communication from Friedrich Hoffmann and Albert Licht*).—" This invention relates to a " novel construction of kiln or oven for burning limestone, bricks, " and other substances by a continuous process," to perform which "the kiln or oven is built of an annular form, and by preference sunk in the ground, so as to leave the roof only exposed. " This enclosed annular space is divided radially into compart- " ments by sliding doors, and each compartment is connected by " a radial flue with a concentric annular smoke chamber, which " surrounds the central chimney shaft." Communications can be opened or closed at pleasure by dampers or doors between the chambers and in the flues.

The materials to be burned being mixed with fuel are placed in the chambers, and a fire having been kindled, the burning is to be maintained unintermittingly, the air admitted from without being obliged to pass through all the compartments that are full before it is allowed to escape into the chimney. As the contents of each compartment become burned, that compartment is cut off from the series, and the air to supply combustion in the others is warmed by being passed through it; similarly the compartments as fast as they are refilled are again brought into connexion with the fire.

[Printed, 10*d*. Drawings.]

1860.

A.D. 1860, January 12.—N° 88.

ROBINSON, George.—(*Provisional protection only.*)—" Im- " provements in the manufacture of carbonate of lead and of " chlorine." These are, first, in the manufacture of chloride of lead by adding " muriatic acid to minium or red oxide of " lead; during this operation chlorine gas is given off," which is collected and employed in the manufacture of chloride of lime, &c.

Second. Mixing an aqueous solution of chloride of lead with a " *solution* of carbonate, or preferably of the sesquicarbonate or " *bicarbonate* of ammonia." "The white lead or carbonate of

" lead is precipitated, and on being washed and dried may be em-" ployed as a paint or may be reconverted by heat into red oxide " of lead, to be used as before and otherwise, while muriate of " ammonia remains in solution and may be obtained by boiling " away the water."

[Printed, 4*d*. No Drawings.]

A.D. 1860, January 19.—N° 137.

BLAIR, Harrison.—" Improvements in the production of car-" bonic acid gas." These are said to be in the Final Specification, the production of carbonic acid gas to be " used in the arts " and manufactures, and where required pure and unmixed with " other gases for such purposes," by " treating carbonate of lime " or other suitable carbonate within a closed vessel and in a " heated state with the vapour of water." The steam is superheated, but not " to redness, in cast-iron steam pipes, as in that " case hydrogen is evolved, which has an injurious action on the " carbonic acid for subsequent use." In the Provisional Specification it is stated that besides " the agency of superheated vapor of " water," " other vapors or gases " may be " admitted internally, " by which means carbonic acid is evolved in a state of consider-" able purity applicable to various useful purposes."

[Printed, 4*d*. No Drawings.]

A.D. 1860, January 21.—N° 153.

LAURENS, Charles Pierre Price.—" Improvements in the " manufacture of chlorine." These are, " heating chloride of " copper (Cu. Cl.) or any other chloride which gives off chlorine " at a moderate heat, and causing the chloride of copper or other " chloride to regain the chloride lost by treating it with hydro-" chloric acid, and so making it available for the production of a " farther quantity of chlorine." The hydrated chloride of copper is dried at 212° to 302° F., until it loses its water and becomes a yellowish brown powder, when it is mixed with about half its weight of sand and heated in a retort from 432° to 572° F., until there is obtained " one equivalent of chlorine from every two " equivalents of chloride of copper." " The sub-chloride of " copper (Cu_2 Cl.), with the sand mixed with it, is then removed " from the retort," and hydrochloric acid added to it and exposed to the air or a current of air and evaporated, and the hydrated chloride of copper is crystallized out and heated before or after it is mixed with the sand, to deprive it of its water, and the above process is repeated.

[Printed, 4*d*. No Drawings.]

A.D. 1860, January 25.—N° 192.

HUNTER, ANDREW GEORGE.—(*Provisional protection only.*)—" Improvements in the separation of sulphur from its combina-" tions with certain metals." These are, by means of " either air, " steam, or a mixture of air and steam, or a mixture of air or " steam with gases or other substances capable of supplying either " oxygen or hydrogen, applied to the sulphuret, either alone or " mixed with other matters, while in a state of fusion." In preference, forcing the above "through and among the fused sul-" phuret, which is maintained in a state of fusion by the heat " evolved from the combinations effected by the action of the " gases introduced." When the heat from this cause is insufficient to keep the sulphuret fused, artificial heat must be applied. " The gases evolved are either sulphurous acid, hydrosulphuric " acid, or a mixture of both, according to the gases introduced to " the sulphuret. Air evolves sulphurous acid, steam hydrosul-" phuric acid, and mixture of air and steam evolves a mixture of " both." In preference, " converting the hydrosulphuric acid " into sulphurous acid by combustion," and the sulphurous acid into " sulphuric acid by means of nitre, as is commonly used in " manufacturing sulphuric acid from sulphurous pyrites." If sulphur is desired, applying " air and steam in such proportions " as to evolve such a mixture of sulphurous and hydrosulphuric " acid as is capable of mutually decomposing each other, and the " sulphur thus produced may be collected in suitable apparatus." The metallic oxide remaining may be used either as a source to obtain the metal, or for any other purpose.

[Printed, 4*d*. No Drawings.]

A.D. 1860, January 27.—N° 212.

DUNCAN, JAMES, SCOTT, ALEXANDER, and DAWSON, JAMES.—" Improvements in reburning animal charcoal, and in " the application of the products arising therefrom, and in the " apparatus employed therein." These are, first, " the system or " *mode of* treating or reburning animal charcoal with the aid of

" the mechanical arrangement for withdrawing the gaseous " matters."

Second, " the application to and use in apparatus for reburning " animal charcoal, of a tube or tubes for carrying away the gaseous " products."

Third, " the system or mode of collecting the gaseous matters " evolved in reburning animal charcoal, and utilizing the same, " either by causing them to assist in heating the retorts, or apply- " ing them to aid in the production of chemical products."

A series of retorts has one, " two, or other convenient number " of pipes passing through the charcoal " placed in them for distillation. " That part of the pipe which is enclosed within the " retort has formed in it a great number of holes, which pass " through the metal in a lateral direction." " The upper portion " of the pipe is extended so as to admit of its being carried into " the shaft or chimney connected with the furnaces, or it is caused " to communicate with other means for exhausting or drawing off " the gaseous products." The gaseous matters " may be applied " to the manufacture of " sulphate of ammonia, and other generally " similar chemical products."

[Printed, 4*d*. No Drawings.]

A.D. 1860, January 31.—No. 256.

JOSSA, FERDINAND.—" Improvements in the manufacture of " sal ammoniac from small and refuse coals, and from the gas " generated in the manufacture of coke." These are, " the exposure of an acid or acids in solution to the smoke and gases " arising from the combustion of small and refuse coals, and in " the manufacture of coke " for the purpose of obtaining the ammonia therefrom. " The smoke may be made to pass over " pans containing suitable acid in solution, or the acid may be " precipitated down a chimney in the form of rain, or trickle " down between closely piled materials, which are exposed to the " ascending column of smoke." The acid is " collected in a " vessel or receiver at the bottom, whence it can be again con- " veyed to the top," and so kept in " circulation till the desired " degree of saturation is effected." Sulphuric acid is the cheapest and most manageable, and hence is preferred. It is in the " earlier stages of combustion of the coal in a coke oven, and " whilst the heat is but low, that the ammonia with which it is

" our purpose to deal must be evolved." " By a single arrange- " ment of flues and dampers " the smoke and gases are directed " for the first 12 hours after lighting so as to pass into the " chamber, chimney, or flue, where they can combine with the " acid," and " at the end of this period, when the whole of the " ammonia has separated from the coal, the oven is placed in " direct communication with the ordinary chimney; the burning " then proceeds as usual."

[Printed, 4*d.* No Drawings.]

A.D. 1860, February 3.—N° 287.

LORBERG, William.—(*Provisional protection only.*)—" A new " or improved method of employing tan or spent bark for che- " mical purposes." Tan or spent bark, either alone or in combination with some adhesive substance, such as tar, is pressed into cakes which are to be distilled for " naptha, acetic acid, tar, " charcoal, &c."

[Printed, 4*d.* No Drawings.]

A.D. 1860, February 4.—N° 293.

WILLANS, Jacob Geoghegan.—" Improvements in the manu- " facture of soda." These are, first, " the use of carbonic oxide gas " and steam or water, conjointly or consecutively, for forming the " sulphuret of sodium from such sulphate as has little or no car- " bonaceous matter in contact therewith; also for the purpose of " removing sulphur from the said sulphuret in the form of sulphu- " retted hydrogen gas, and the simultaneous production of a useful " soda alkali in other than a dissolved state." The gas is brought into contact with the sulphate at a red heat; the gas is obtained " by preference by the action of a blast of atmospheric air upon " burning coke in a cupola furnace." When the furnace is at a bright red heat the powdered sulphate of soda is spread evenly over the floor to a depth of about one inch, the door is fastened to exclude air, the carbonic oxide is next admitted, and the steam or water jets are turned on at the opposite end, and continued with stirring, until on examination the sulphate proves " to have " been satisfactorily decomposed into sulphuret." In decomposing the sulphuret, the material is kept " in a slightly moist " state, yet not in a liquid state."

Second. " The application of steam or water to the sulphuret *of sodium* in less quantity than sufficient for making a solution

" thereof, whilst being or after having been formed from the sul-" phate, with peat carbon intermixed, for the removal of sulphur " in the form of sulphuretted hydrogen gas."

Third. " The use of the sulphur contained in the sulphuretted " hydrogen given off in any of the preceding processes for the " production of sulphurous or sulphuric acids." The sulphuretted hydrogen is brought into contact with " revivifiable oxide of " iron," and it is " saturated and revived to the required extent," and the sulphur is separated " by sublimation, in any convenient " manner for use, in the production of sulphurous acid," or it is burned off " as sulphurous acid for the manufacture of sulphuric " acid."

[Printed, 4*d*. No Drawings.]

A.D. 1860, February 6.—N° 314.

NEWTON, ALFRED VINCENT.—(*A communication from Ferdinand Feist Mayer.*)—(*Provisional protection only.*)—"An improved mode " of producing certain compounds of lead." This is said to consist in producing " chloride of lead or other compounds of lead, such " as oxichloride of lead, binoxide of lead, nitrate of lead, carbonate " of lead, or chromate of lead, in a simple and cheap manner from " sulphate of lead, or to produce the last-named compounds from " chloride of lead, which may have been prepared in any other " already known manner." "The process consists in treating " sulphate of lead, or chloride of lead, with chloride of sodium, or " chloride of calcium, or with the chloride of any other alkali, " metal, or alkaline earth metal." As an " example, the sul-" phate of lead is mixed into a thin paste with a concentrated " solution of chloride of sodium, or common salt, and in this " state it is introduced into a saturated hot solution of chloride " of sodium, when the same is decomposed." " The largest " portion of the lead precipitates as chloride, and another " portion, together with the impurities, remains in solution." There is nothing said as to how the other lead compounds are to be prepared.

[Printed, 4*d*. No Drawings.]

A.D. 1860, February 9.—N° 352.

DEACON, HENRY, and ROBINSON, THOMAS—" Improve-" ments in the manufacture of soda." These are, " the applica-" tion of a cupola or separate combustion chamber," which is

" blasted with air, in combination with any decomposing apparatus, reverberatory or other furnaces used in the manufacture " of soda, for the purpose of decomposing the salt or salt cake, " roasting the salt cake, making the black ash, and evaporating " and finishing or calcining the soda." "The heat passing away " from any of these furnaces may be economized for evaporating " or heating liquids, or other purposes, in any of the well known " methods, or the heat may be used for heating the blast or hot " blast obtained in any other way may be used." Various forms of "furnace and passages may be made and other forms or dimensions of cupola, and various pressures of hot or of cold " blast may be used to suit particular kinds of fuel, or other " circumstances."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1860, February 22.—N° 476.

NEWTON, WILLIAM EDWARD. — (*A communication from Timothy Hill Lang.*)—" Improvements in digestors for dissolving " quartzose rocks." These are said to be " fitting the digestor " with a swinging scraper, whose shaft and arms constitute pipes " and passages for the introduction of superheated steam into and " among the charge." The digestor consists of a stong iron cylinder capable of sustaining " sixty pounds pressure or more, or " a little less." "Through this cylinder passes a hollow shaft, " which turns in bearings fixed in the ends of the cylinder," provided with arms, to which a longitudinal scraper is attached, and a reciprocating or vibratory motion is communicated to the shaft and the scraper connected therewith by means of a crank or other suitable contrivance. " Steam is first taken from a " common boiler, and superheated on its passage " is conducted into the hollow shaft by a coupling pipe, whence it passes down the arms of the scraper and is discharged in the form of jets. " The cylinder is provided with a manhole at the top, and a " discharge faucet or opening is adapted to the lower part of the " cylinder in order to enable the dissolved silicious matter to be " run off."

[Printed, 6*d.* Drawing.]

A.D. 1860, February 24.—N° 510.

WETTER, CONRAD.—" Improvements in the manufacture of " *fermented* and spirituous liquids." These are, applying " the

" cane or plant known as 'sorgho,' 'sorko,' or 'sorco,' and from " the same extracts worts and wash are produced, and the same " converted by ordinary processes into wine, beer, ale, vinegar, " and other fermented liquors and spirits." By the name sorgho " is understood the sugar cane which has been imported from " China and from Africa, and its varieties. It is also known by " the names of 'sorghum saccharatum,' and 'holchus saccharatus,' and by the name of 'imphee.' The juice thereof may " be set to ferment with yeast or without yeast, as the juice " contains naturally sufficient ferment to excite the various " fermentation. The cane may also be crushed, and the crushed " cane fermented in its own juice, diluted or not diluted with " water, or with or without other ferment exciting drugs." "In " order to make vinegar the fermented sorgho juice is drawn off " clear from its sediment, and placed into upright casks with air-holes above the surface of the fermented juice, and four gallons " of real vinegar added to 100 gallons of fermented juice, at a " temperature of 97 Fahrenheit, and the air in the room must be " kept at the same temperature, and impregnated with vinegar " fumes. The acetous fermentation will thus be excited in the " fermented juice, and convert it into vinegar, which is then " drawn off clear, and kept in a cool cellar."

[Printed, 4*d*. No Drawings.]

A.D. 1860, March 1.—N° 568. (* *)

BUSH, William.—" Manufacturing granulated seidlitz powder." This "consists in dehydrating the carbonated alkalies of potash " and soda, and mixing them with a correct proportion of acid ;" also, "dehydrated sulphate of soda may be added or omitted." The whole is brought "to state of partial fusion," and "passed " through a perforated apparatus for the purpose of granulation."

[Printed, 4*d*. No Drawings.]

A.D. 1860, March 16.—N° 704.

NIXON, James.—(*Letters Patent void for want of Final Specification.*)—" Improvements in the manufacture of hyposulphate of " soda." These are, " reducing in a furnace sulphate of soda or " salt cake with coal, charcoal, or any other carbonaceous matter " or reducing agent." In practice it is useful to add some infusible compound, as sulphates of baryta or lime to prevent it " running out of the furnace. When the mass is well fused it is

" withdrawn from the furnace," allowed to cool, and ground is treated by either of the two following processes:—

1st. The powder is mixed with about an equivalent proportion of sulphur, it commences to heat, it is occasionally turned and watered to cool it, in about a week it "has swollen much and " become quite cool." The mass is lixiviated with water, and the solution is evaporated to crystallization. Instead of sulphur being used as above, " a compound of sulphur would answer, " such as pyrites or the polysulphurets of sodium."

2nd. The ground material dissolved in water, a current of sulphurous acid is passed into the solution, or the solution is passed through a tower filled with coke, where it is met by a current of sulphurous acid; the gas becomes absorbed, and on boiling down the solution and crystallizing the hyposulphite of soda is obtained.

Hyposulphite of soda is made by mixing sulphuret of barium with sulphate of soda, " with or without the addition of sulphur " or compound thereof, and exposing the mixture to the air," hyposulphite of soda dissolves out of the mass by water. Or a solution of sulphuret of barium may be mixed with a solution of sulphate of soda, the solution drawn off from the precipitate and " gassed with sulphurous acid as described above, boiled down, " and crystallized gives hyposulphite of soda."

[Printed, 4*d*. No Drawings.]

A.D. 1860, March 17.—N° 712.

RICHARDSON, Thomas, and **PRENTICE**, Manning.—" Improvements in the manufacture of hydrated oxides and salts " of iron, and salts of the fixed alkalies." These, are, first, " submitting oxides of iron to the action of sulphurous acid, " and exposing the solution to the atmosphere to obtain hydrated " oxides of iron and sulphate of iron." Condensing towers are filled with " burnt pyrites, which is now a waste product in " chemical works;" these " are supplied with a stream of water, " which in falling meets a current of sulphurous acid, which " may be obtained from those ores too poor for the use of sulphuric acid makers." " The solution on exposure to the air, " either before or during concentration, furnishes a hydrated " oxide of iron, well adapted for the purification of coal gas or " as a manure, to act as a purveyor of oxygen to the land." The liquor at 40° Twaddell is "set aside for the crystallization of "ordinary green copperas."

Second. Decomposing the solution from the condensing tower "by muriate of soda or potash to obtain corresponding alkaline "salts, and also muriate of iron," from which "hydrated oxides "of iron may be precipitated." Instead of using water, supplying the "condensing towers with a solution of muriate of potash "or soda, at about 15° Twaddell," conducting the operation "until the solution of the mixed salts stands at 50 Twaddell," evaporate and crystallize out the salts. "The mother liquor con- "tains the muriate of iron which may be employed in this state;" or it is dried up with sawdust, and the mixture employed "in "purifying gas, or liquors containing sulphur compounds;" or it is first mixed "with an equivalent quantity of lime, magnesia, "baryta, or their carbonates," and then dried up with sawdust.

[Printed, 4*d*. No Drawings.]

A.D. 1860, March 21.—N° 731.

HERBERT, JANE ANN.—(*A communication from Ludwig Brumlea.*)—"Manufacturing of oxychloride of lead." The claims of the inventor are as follows:—First, "that chloride of "lead and subacetate of lead will decompose each other, and cause "the formation of oxychloride of lead and acetate of lead."

Second. "The whole rotary process," afterwards described, "for the purpose of manufacturing oxychloride of lead from "chloride of lead and subacetate of lead, leaving the liquid free "to be used over and over again for the same purpose."

Third. "The manufacture of oxychloride of lead in any man- "ner, performed by decomposition of subacetate of lead by "chloride of lead or muriatic acid."

Melted lead is "passed through a perforated vessel or sieve "into water, forming a fine lead wire." This wire is placed in a series of deep tubs emptying into each other, the first of which is filled with dilute acetic acid, or a weak solution of acetate of lead, and after a few minutes it is drawn into the second and so on; by exposure to the air the lead oxidizes on its surface, "by refil- "ling said tubs with acetic acid," the oxide of lead formed on the lead wire will be rapidly dissolved; the acetic acid may then be drawn off as quick as possible, and the process is repeated until all the lead wire is "formed into white oxide of lead." "The

" tubs may then be refilled with new lead wire, &c., and the same " process continued over and over again."

To make acetate of lead, " a portion of the said tubs containing the lead wire are filled with acetic acid;" in "a few minutes acetate of lead is formed, and is drawn off and agitated with muriatic acid, chloride of lead is formed and " settles to the " bottom," " leaving the vinegar or acetic acid nearly free," to be again used " over again for a similar process."

" To make subacetate of lead for the formation of oxichloride " of lead " the second set of tubs containing the lead wire are filled with a solution of " acetate of lead, and reduced to a strong " subacetate of lead," then drawn off and agitated with the chloride of lead, " will form white oxychloride of lead, until the " subacetate of lead will be returned into acetate of lead, which " is then drawn off, and may be used over and over again " as above. " The oxychloride of lead " will settle to the bottom, and is washed, dried, and packed.

" The oxichloride of lead may also be made " by adding with great care " muriatic acid directly into subacetate of lead, so long " as the liquid is kept below neutral." " The subacetate of lead " may also be made by dissolving litharge in acetic acid."

Printed, 4*d*. No Drawings.]

A.D. 1860, March 21.—N° 733.

RICHARDSON, THOMAS.—" Improvements in the manufacture " of salts of alumina." These are, " subjecting aluminous " minerals to the action of sulphurous acid." Towers are filled with " alum shale, or coal shale, china, or common clay in a raw " or roasted state," and a current of sulphurous acid gas is passed up these towers, " where it meets a descending shower of water, " or of a weak solution, after the process has been long enough " in operation to furnish weak liquors." " The liquor as it leaves " the last compartment " of the tower " is pumped up to supply " the towers, and the operation repeated until the liquor stands " at or about 16° Twaddell." " This solution may be evaporated " down to dryness to make an aluminous cake, or it may be concentrated and mixed with the usual potash or ammoniacal " salts," for " the production of potash or ammonia alum." If *the solution* is evaporated with much exposure to the air, sulphate *of alumina* is produced, if evaporated with little exposure, it consists chiefly of sulphite of alumina. Ammoniacal water may be used in place of ordinary water in the towers. Sulphurous acid is made in the same towers, filled with flints, &c., and the aluminous mineral is acted on with this solution. Or a thin fluid mixture of aluminous mineral, and "ordinary or ammoniacal "water" is pumped to the top of the towers, and as it passes over the flints it meets the stream of sulphurous acid gas. Or a close cistern is filled "with any of the aluminous minerals and "ordinary or ammoniacal water," and sulphurous acid gas is forced in "until all or nearly all the alumina is dissolved." "When "it is desirable to obtain muriate of alumina," employing muriate of potash, after "crystallizing out the potash alum, the "mother liquors" contain muriate of alumina. Using muriate of soda in place of muriate of potash, sulphate of soda will be obtained, and "the mothers will contain the muriate of "alumina."

[Printed, 4*d*. No Drawings.]

A.D. 1860, April 2.—N° 840.

DAHLL, Tellef.—(*Provisional protection only.*)—"An improvement in the separation of nickel and cobalt from magnetic "pyrites and bisulphuret of iron, or any other sulphur composition." This consists in extracting nickel and cobalt "from "their ores without liquifying and without applying acids." The ores are reduced to fine powder, which is placed two or three inches thick in a furnace and heated with stirring till it becomes red hot, air being allowed to pass through the opening at one side of the furnace. This temperature is arrived at in about half an hour, when "there is added about ten per cent. of the clearest kind of "salt," when the whole is well mixed and the roasting continued "for about half or one hour." After adding the salt, "the stream "of sulphur (SO_2) becomes very strong. and after 1 or 1½ hours "time, after the metal has been added," it begins to glow stronger and to discharge chlorine to a very considerable extent. "The "fire is now extinguished in the furnace, and care is taken by "constant stirring of the metal flour that the temperature is held "as low as possible, as it is injurious if the same should be high. "The metal flour glows still for about 2 or 3 hours, and the "steam of chlorine" continues for some hours; when the matter is cooled it is placed in "suitable wooden tubs or any other material

" which is able to stand against the influence of acid solution, " and water is poured over it, in which it remains for about 24 " hours. In this manner a solution is obtained which contains " nearly all the nickel and cobalt and the copper which exists in " the ore, but however only an inconsiderable quantity of iron."

[Printed, 4*d*. No Drawings.]

A.D. 1860, April 3.—N° 859.

JENSEN, Anthon Nicolay.—" Improvements in brewing " worts from saccharine and farinaceous substances, with a new " method of retaining the aroma and better qualities of the hops, " forming an infallibly keeping ale nearly white, and admiting of " aeration, part of which improvements is applicable to disstillers' " wash, vinegar making, and preserving fermentable liquors." These are, in reference to this subject, in producing saccharine worts by subjecting them to extreme dilution and decanting off the brighter liquor and converting such worts " into the basis for " ale or other liquors," by " the system of total or complete " attenuation in the fermenting process." " The white or almost " colorless ale or basis produced," amongst other purposes named " may be converted into vinegar, either by slow or instan- " taneous acidification, and vinegar made therefrom would not " be liable to turn 'ropy,' as it would not contain any of the usual " glutinous viscid matters." But no process is given for its conversion into vinegar either by the " slow or instantaneous acidifi- " cation."

When " operating upon rice, potato flour, or other substances " requiring a different process of saccarization to malt," adding " about twenty per cent. of thoroughly malted barley or about " five per cent. of sulphuric acid." " The time required for " saccharization at a temperature of 150° F." with malt " will be " about three hours," with acid " from five to ten hours according " to the density of the acid employed."

[Printed, 4*d*. No Drawings.]

A.D. 1860, April 24.—N° 1023.

WRIGHTSON, Francis.—(*Provisional protection only.*)—" Im- " provements in applying certain waste or refuse products to the " purification of coal gas, and in utilizing compounds obtained " in purifying coal gas." Coal gas is purified by such sewage of towns as contain sulphuret of iron in addition to organic matter. The sewage is dried and treated with mineral acids, whereby the sulphuret of iron is converted into salts suitable for the purification of coal gas from ammonia and sulpho-cyanogen compounds, applying the salt of "pickle waste" (the acid liquid which has been employed in cleaning iron), obtained by evaporation, to the same purpose. The pickle waste contains "supersalt of iron and "free acid." Utilizing compounds obtained in purifying gas. "I distil sulphur from the residual product obtained in the said "purification, called ochre waste, sulphur waste, or spent oxide. "I afterwards treat the residuum with mineral acid, and obtain "thereby salts of iron, which are suitable for the purification of "coal gas from ammonia and sulpho-cyanogen compounds. "After use the ammoniacal salts are extracted by means of water, "and the residuum is boiled with milk of lime, peroxide of iron "in the hydrated state is thereby obtained, which may be applied a fresh for purifying coal gas from sulphur. In each case "the salts of iron are mixed with some porous organic substances, "such as sawdust, or shoddy."

[Printed, 4*d*. No Drawings.]

A.D. 1860, April 24.—Nº 1027

CLARK, William.—(*A communication from Louis Joseph Frédéric Margueritte and Alfred Lalouël de Sourdeval.*)—"Im-"provments in the manufacture of ammonia." These are, first, manufacturing ammonia by means of "a mixture of caustic "baryta and comminuted or small charcoal" as afterwards described.

Second. Manufacturing ammonia "by passing a current of air "or azote charged with steam over the mixture" above described and under the conditions afterwards described, also "the prepara-"tion of cyanides and ferrocyanides with ammonia prepared" by this process.

Carbonate of baryta (or other alkali), natural or artificial, is calcined in an earthen vessel "with from twenty to thirty per cent. "of resinous substance and coal tar, with a certain quantity of "pure or other sawdust." Caustic baryta is obtained, the crucible is cooled down "to a deep red color, and then plunged into "water heated to one hundred degrees centigrade." "There is "at the onset a production of gas which escapes and burns, but

" the temperature lessens gradually until it arrives at a certain " degree, when the production of ammonia commences which is " indicated by the smell. At this moment the cover of the crucible " is raised, the air enters and circulates freely; it penetrates the " mass which remains in an incandescent state," and " quantities " of ammonia are produced," the crucible being placed in a chamber the ammoniacal products are withdrawn and forced into water and mixed with any kind of acid. The operation may be carried on in a retort cooled down " a little below 300° centigrade," air previously saturated with steam being passed into it. The same mixture will serve a certain number of times before replenishing the charcoal. " Azote appears to be preferable to air;" air calcined over charcoal and passed over lime is also employed.

[Printed, 4*d*. No Drawings.]

A.D. 1860, May 1.—N° 1099.

HENDERSON, William.—" Improvements in the manufacture " or production of nitrate of potash and soda, and in the appli- " cation and use of certain products of such manufacture in the " manufacture of soap." These are, first, in producing saltpetre or nitre, " dissolving together potash and nitrate of soda in their " equivalent proportions, or in any other proportion which may " may be convenient or necessary;" or the ingredients may be " dissolved separately and mixed, and the nitre obtained by " evaporating and crystallizing. The mother liquor contains " caustic soda employed in making soap."

Second, " nitric acid, which has been used in bleaching palm " oil, is neutralized with lime and decomposed with sulphate of " potash, thus forming nitre."

Third, " the potash may be made caustic in the manner ordi- " narily pursued by soap-makers; the resulting ley is afterwards " made into soap by boiling it with fatty matters." The soap is is then " cut up " or separated by the agency of nitrate of soda; the resulting soap is washed or cleansed as often as is convenient or necessary, by boiling it with a solution of nitrate of soda. The liquor pumped from the soap-pans now contains nitre; the liquor is again " evaporated, salted, and crystallized, as often as is " required for the removal of the whole of the nitre." In this way the production or manufacture of nitrate of potash and of *carbonate* and caustic soda may be effected in a very economical *manner*.

[Printed, 4d. No Drawings.]

A.D. 1860, May 5.—No. 1126.

HUNT, WILLIAM.—"Improvements in the manufacture of car-"bonate of soda, and in apparatus to be employed in the said "manufacture, also in utilizing waste products obtained in the "said manufacture." These are, first, "manufacturing carbonate "of soda by exposing sulphuret of sodium to a current of car-"bonic acid gas obtained by heating limestone or chalk in close "vessels or retorts without the aid of steam."

Second, "the general arrangement of apparatus to be used in "the manufacture of carbonate of soda." There are four retorts heated by two furnaces; the chalk is put into these retorts and the carbonic acid driven off is conveyed by tubes in the lids of the retorts into a main pipe, from thence it is made to pass through three or more carbonating vessels in which the sulphuret of sodium is placed on false bottoms, while at the same time steam from a boiler is introduced into these vessels; the sulphuretted hydrogen passes from the last vessel to a chamber to be afterwards dealt with.

Third, "the re-use of carbonaceous matter which is obtained as "a residuum after dissolving out from it the carbonate of soda," or "obtained as a residuum when the sulphuret of sodium is dis-"solved from the said coke" "irrespective of the method by "which the sulphuret of sodium is manufactured." This is mixed "with a little fresh coal slack to decompose a further "quantity of salt cake."

Fourth, utilizing the sulphuretted hydrogen evolved above by mixing it with air, igniting it and conducting it into the bottom of a small chamber filled or nearly so with pebbles or broken brick, &c. for the purpose of obtaining sulphurous acid which "may be made into sulphuric acid in the usual manner."

Fifth, "utilizing the free sulphur which occurs as a residuum "with the carbon or coke" after dissolving out the carbonate of soda, by washing it away from the coke, "by splashing a quantity "of water upon it," allowing "the water so splashed on the coke "to run freeely from the vessel or vat" into a tank where the light "earthy matter and sulphur are deposited," and collected, and may be distilled or burnt and the sulphurous acid "applied "to the manufacture of sulphuric acid or other purpose." "Or "the whole of the coke containing the free sulphur may be heated "in an earthen retort, and the sulphur distilled off and used."

as above. In the Provisional Specification there does not appear to be anything said as to the obtaining or using of this sulphur.

[Printed, 10*d*. Drawings.]

A.D. 1860, May 8.—N° 1135.

CORBETT, John.—" Improvements in evaporating pans for the " manufacture of salt." These are, first, making these pans " of " plates of cast iron instead of wrought iron as heretofore, the " said cast-iron plates having flanges made upon them, by which " flanges the said plates are screwed or bolted together," by bolts and nuts; " cement or other packing may be inserted between " the flanges to make them water or steam tight."

Second, " applying to evaporating pans a pocket or trough into " which the salt can be raked as it falls to the bottom of the pan," the " pocket or trough running all round the pan, or on two sides " only of the pan, and having communication with the body of " pan to convey the hot brine drained from the salt in such " pocket to the body of the said pan." This pocket is formed by " a ridge or plate rising nearly to the top of the pan and being " situated about a foot from the sides of the said pan." Near the bottom of the pocket are perforated holes for the purposes mentioned above.

Third, " the improvement in the bulged bottom of the pan" " the gradual rise in every direction from both ends and sides to " the middle of the pan," applicable " not only to cast-iron pans " but to pans made of wrought iron or any other material."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1860, May 11.—N° 1171.

CLARK, William. — (*A communication from Louis Joseph Frederic Margueritte and Alfred Lalouël de Sourdeval.*)—" Improvements in the manufacture of cyanides of barium and strontium." These are, obtaining " cyanides from baryta by means " of the azote of the air and the preparation of cyanides of barium " and strontium" as follows:—Carbonate of baryta is mixed with " from ten to thirty per cent of pitch, coal-tar, or resin, and " a certain quantity of sawdust, or charcoal, or coke, to sub" divide the mass and render it porous;" this mixture is calcined while a current of air or " of azote at a high temperature" is passed on to it; the "azote combines with the minutely divided "carbon" and "forms cyanoyen and ultimately cyanide of "barium."

Another process is passing on to the mixture of carbonate of baryta and sawdust or charcoal "a mixture of illuminating gas "and azote at a red heat;" baryta is formed and "ultimately "cyanide of barium." A third process is passing on to "a mixture of carbonate of baryta and animal matters subdivided "with charcoal or sawdust," a current of air or azote at a red heat; "in this manner the quantity of the cyanide of barium pro"duced will be considerably augmented." Cyanide of potassium may be obtained "by a double decomposition of sulphate of potash "with cyanide of barium."

[Printed, 4*d*. No Drawings.]

A.D. 1860, May 12.—N° 1177.

SENIOR, William, and STATTER, William.—(*Provisional protection only.*)—"Improvements in purifying gas, and thereby "obtaining a useful product." These are, "the application of "the fibres of cocoa-nuts, flax, hemp, and several other vegetable "fibres in the purification of gas from ammonia, which fibres we "have discovered possess the property of absorbing ammonia as "the gas passes through or amongst them. The fibres will absorb "ammonia from gas even when in a dry or comparatively dry state, "but they act more efficiently when moistened with water."

[Printed, 4*d*. No Drawings.]

A.D. 1860, May 19.—N° 1239.

LONGMAID, John.—"Improvements in treating iron pyrites "and other ores containing copper, silver, and tin, or either of "them, and sulphur." These are said to be "carrying on the "two processes of calcining pyrites or other ores, and the decom"posing such ores by common salt simultaneously in the same "furnace," as follows:—"The ground pyrites are introduced "into one compartment or chamber of the furnace, and the heat "of such compartment causes the same to be calcined, and the "sulphurous acid evolved passes off and is converted into sul"phuric acid. The calcined pyrites or other ores are then com"bined with common salt and placed in another compartment of

" the same furnace; the products obtained are then treated in " the well-known manner. It is preferred to employ a reverberatory furnace divided horizontally, so that the products of " combustion pass through the lower compartment, and heat " both it and the chamber above." It is preferred to work the charge of ground pyrites in two divisions in the higher chamber of the furnace "in order to produce a continuous evolution of " sulphurous acid, which is passed into a leaden chamber as is " well understood in the manufacture of sulphuric acid." The partially calcined ores are mixed with common salt and kept at a dull red heat in the lower chamber. The salt "is for the most " part converted into sulphate of soda, and the copper and silver " into chlorides of those metals soluble in water." The oxide of tin, if any, is "separated by washing in the manner practised in " the tin mines in Cornwall." The solution "contains the alkaline salts and chlorides of copper and silver, from which these " metals are precipitated by means of iron, as is well known."

[Printed, 4*d*. No Drawings.]

A.D. 1860, May 19.—N° 1240.

BINKS, Christopher, and MACQUEEN, John.—" Improvements in treating certain manganese compounds for obtaining " oxides of manganese and other products therefrom." These " are, first, "causing atmospheric air or oxygen gas" to be "in " contact with a salt of manganese in solution simultaneously " with any decomposition of the salt that shall set free its oxide, " for the purpose of super-oxidizing the oxide, or in some cases " of aiding the decomposition."

Second, "passing atmospheric air or oxygen gas" either cold " or heated in preference from 400° to 600° F., or even higher, " into and through water, in which is mixed or suspended or " being liberated, protoxide of manganese or any other inferior " oxide of manganese, for the purpose of raising such oxide to a " higher or full state of oxidation."

Third, "the application of strongly heated atmospheric air or " oxygen gas" to "mixtures of hydrochlorate of manganese in " solution, and native or other carbonate of lime, or carbonates " of lime and magnesia, in order to facilitate the reactions between " or decompositions of these substances." The temperature preferred is about 480° F.

Fourth, the application of the same elements, " or of these or " any one or more of them mixed with chlorine, to carbonate of " manganese mixed with or suspended in water, in order to effect " the decomposition of the carbonate and super-oxidation of its " protoxide." The temperature preferred is between 500° and 600° F.

Fifth, " the application of carbonic acid gas, or of that mixed " with oxygen gas or atmospheric air, to the lower oxides of manganese when in contact with or suspended in water," and " alternately so applying carbonic acid gas and oxygen, or atmospheric air alone or when mixed with chlorine, in order to effect " the peroxidation or super-oxidation of such oxides, or a portion " of them."

Sixth, "the peroxidizing of sesqui or of any other oxide of " manganese intermediate (in respect of its proportion of oxygen) " between the sesqui and the peroxide, by heating it along with " some hydrochlorate, such as the hydrochlorate of magnesia."

Seventh, " the application of atmospheric air or of oxygen gas, " with or without the addition thereto of chlorine, to inferior " oxides of manganese when such oxides are mixed with or suspended in any caustic alkaline solution, or in a solution of " certain hydrochlorates, as those of manganese or iron, or of " magnesia, for the purpose of effecting the super or peroxidation " of such oxides."

Eighth, "the production of peroxide of manganese and of " chlorine by means of the series or combination of processes," described under the sixth head.

Ninth, " condensing or hardening artificial oxides of manganese " for their application in chlorine making," by causing them to be compressed "by any convenient mechanical means;" this "is " best effected whilst the oxide is in a moist state, and it is left " finally in hard cakes or lumps." Or " moistening a mass of " the oxide with some hot concentrated saline solution, preferably " with a solution of hydrochlorate of manganese, which on cooling and crystallizing serves to bind together the particles, and " solidify the mass."

[Printed, 6*d*. No Drawings.]

A.D. 1860, May 24.—N° 1288.

BAKER, WILLIAM.—" Improvements in the manufacture or " production of white lead." These are, " substituting for acetic

" acid as now used in the Dutch method for the manufacture of " white lead, salts of acetic acid, from which acetic acid may be " produced or liberated by the employment of either sulphuric " acid or hydrochloric acid, or mixtures thereof, or by the employ- " ment of acid sulphates of the alkalies." The acetates " found " to answer for this purpose are the acetates of lime, acetates of " soda, and the soluble acetates of the alkalies and the alkaline " earths, or others of a like nature." To any of these is added " a chemical equivalent of or a slight excess of sulphuric acid or " hydrochloric acid, or of mixtures thereof, or of the bisulphates " of soda or potass," so as to set free " all the acetic acid " previously combined with the base." Proportions of these substances from which " good results " have been obtained are given, but they may be varied.

[Printed, 4*d*. No Drawings.]

A.D. 1860, May 28.—N° 1309.

ROBINSON, George.—" Improvements in the manufacture of " salts and preparations of ammonia." These are, first, " heating " sulphate of ammonia " to a temperature of between 500° and " 600° F., and bringing the vapour of ammonia thus evolved, " after it is washed in a small quantity of water, into contact with " carbonic acid gas " in " suitable passages and chambers, where " the carbonic acid and ammonia combine and condense into a " solid crystalline deposit."

Second. Manufacturing alum from the acid sulphate of ammonia " (bisulphate or supersulphate) " by " boiling with it " roasted and pure clay." When " it is intended to manufacture " alum directly from the sulphate of ammonia," the latter " is to " be mixed with nearly an equal quantity of pure clay," and the mixture exposed to a temperature of between 500° and 600° F., the ammonia washed and condensed as above, and the residue lixiviated, and the solution crystallized for the alum.

Third. " The use of the solution of the bisulphate or supersul- " phate of ammonia in water, to fix fresh ammonia, and thereby " form fresh sulphate of ammonia instead of employing for that " purpose additional sulphuric acid," as in the " process of " obtaining sulphate of ammonia from the ammoniacal liquor " of gas works."

[Printed 4*d*. No Drawings.]

A.D. 1860, May 30.—N° 1334.

GREENWAY, Charles.—" Improvements in the manufacture " of salt, and in apparatus used therein." These are in " the " combined arrangement " of apparatus as follows :—" A series " of upright boilers are set in a suitable flue, which is heated by " a fire or fires by preference at one end ;" the lower end of each boiler is conical, and protected from the heat by brickwork ; the boilers are covered when at work. " The lower end of each boiler " is capable of being closed by a valve which is kept open, " except when salt is being withdrawn from a lower vessel which " is attached to a descending tube fixed to the lower end of each " boiler." " The lower end of each of such vessels is conical, " and closed at the bottom by a valve." The brine in boiling deposits the salt in the several lower vessels, which is removed from time to time by closing the valve in the upper vessel and opening the valve in the lower vessel. " The steam generated in " the series of boilers is conveyed away from the upper parts of " the boilers by suitable steam pipes, and such steam is used for " heating brine in suitable pans or vessels for making other " classes of salt." The boilers are so arranged in the flue " that " the heat and products of combustion may pass alternately in " succession partly around each of the boilers, such boilers being " set alternately to the right and left hand walls forming the sides " of the flue."

[Printed, 6*d*. Drawing.]

A.D. 1860, May 31.—N° 1343.

MANNING, James Alexander. — " Improvements in the " treatment, application, and use of sewerage matters and the " general waste of towns and factories." These are, in reference to this subject, first, in treating sewage it is brought into tanks and allowed to settle, and " waste animal charcoal " is occasionally employed as a decolorizer of the supernatant liquid. This " charcoal is made from the hoofs and horns of animals, and " is a waste or refuse substance arising from the manufacture of " prussiate of potash." Before using it for the above purpose it is washed and dried, and " if found useful or profitable the water of lixiviation may be evaporated for the purpose of obtaining " whatever salts may be dissolved therein for admixture or other- " wise with the manufactured manure."

Second. The sewage matter is distilled in an arrangement of retorts, and the gaseous matter is conveyed into a tank containing water; "this refrigerator is a closed vessel, so that when the " water contained therein is saturated with the ammoniacal " gaseous products, the other gases pass through an elbow pipe " fitted to the upper part of the refrigerator, and are conveyed " into a second refrigerating vessel." "The ammoniacal liquor " is converted by the ordinary process into sulphate of ammonia," which process is "to run off the liquor after the first boiling into " a suitable vessel, and apply lime thereto and redistil it;" but this process is shortened by forcing cream of lime by means of a pump into "the ammoniacal liquor in the boiling or distilling " vessel after the distillation has proceeded to a certain extent," and thus obtain and "draw over into the sulphuric acid tun all the " ammoniacal products of the liquor at one instead of two operations." The calcined sewage from the retorts is lixiviated, and the solution evaporated to obtain "the valuable salts therefrom."

[Printed, 6*d*. No Drawings.]

A.D. 1860, June 1.—N° 1354.

HUNTER, ANDREW GEORGE, the younger.—" Improvements in " the manufacture of chlorine." These are, "subjecting the " residual waste liquors from the manufacture of chlorine to the " processes" afterwards described, "whereby the excess of free " acid is utilized and neutralized," and the iron and manganese "obtained in the state of oxides." These liquids are first neutralized, in preference, by carbonate or hydrate of lime, though other preparations of lime or alkalies may be used, using by preference waste products, as sulphuret of calcium from "soda-makers' vat waste, or from gas works," &c., then precipitating "the oxides of iron by means of hydrate " or carbonate of lime, continuing to add the hydrate or carbonate of lime so long as the precipitate is reddish brown." This precipitate of oxide of iron is washed. The oxide of manganese in the solution is precipitated "by means of hydrate of lime " or other caustic alkali," and the precipitate washed is used " for any of the purposes for which protoxide of manganese is " used, or it is calcined" in air, "by which it will be oxidized " and rendered suitable for being again employed in the manufacture of chlorine." To "utilize the free acid usually contained

" in waste liquors produced in the manufacture of chlorine by " the action of hydrochloric acid upon manganese ores," allowing these waste liquors "to act upon artificially prepared oxide of " manganese in stills or other suitable vessels, and collecting the " chlorine thereby evolved."

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 5.—Nº 1380.

BOWER, George.—" Improvements in apparatus for manufac" turing, controlling, and regulating the flow of gas." These are, in reference to this subject, a generator for the manufacture of gas. "Upon a strong metal frame, which carries a set of circular " fire-bars, is placed an upright cylindrical or slightly conical fuel " chamber or furnace of metal, lined internally with fire-brick, " and fitted on opposite sides with double doors one above the " other. The upper doors are for the purpose of supplying fuel, " the lower ones for cleaning the fire-bars. A suitable smoke flue " is connected with the upper part of the furnace. In the centre " of the furnace or fuel chamber, and projecting slightly above and " below it, is placed a cylindrical cast-iron retort, the lower end of " which is capable of being closed by a disc plate and luted door, " opened and shut by means of a forked lever when the spent " charge is to be withdrawn from the retort. At the upper end " of the retort there is a cast-iron chamber, closed by a luted plug " at the top, with an outlet at the side for the passage of the gas " to the purifier. The coal, lignite, shale, or other solid material " is fed through a hopper into the retort, and allowed to remain " until the whole of the gas is extracted from it." This " gene" rator may also be used for the manufacture of oxygen, or of " carbonic acid gas; in the former case the retort must be charged " with the black oxide of manganese, in the latter case with chalk " or other suitable material."

[Printed, 10*d*. Drawing.]

A.D. 1860, June 8.—Nº 1412.

CROLL, Alexander Angus.—" Improvements in the purifica" tion of gas." This consists, not in " the use of alum or sul" phate of alumina when either is used by itself," but in "the use " of shale or spent shale, or other aluminous matter combined or " saturated with sulphuric acid, in the purification of gas," as follows :—Roasted alum shale is mixed in the dry state with an equal proportion of sulphuric acid of 80 per cent. The mixture is made with stirring at a temperature of 220° F., the stirring being continued " until the acid has cooled down, so as to prevent their " solidifying into a compact mass," otherwise it will have to be broken up. The most suitable form is " separate granules or por- " tions about the size of peas." The compound thus obtained is put into purifiers similar to those used for dry lime, and the gas is passed through the material until "the material has become " spent," observed by the use of "turmeric or reddened litmus " paper, as is well understood." " A similar effect may also be " obtained by using pipe clay as prepared for the manufacture of " alum, and treating it by sulphuric acid as above stated in rela- " tion to shale." " A beneficial effect may also be obtained by " using the spent shale which has been employed in the manufac- " ture of alum."

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 12.—N° 1433.

REDWOOD, Theophilus. — "Improvements in the manu- " facture of paper." These are, first, "the use of sulphite of " barytes in the manufacture of paper." The sulphite of barytes " is produced " either by decomposing carbonate of barytes with " a strong aqueous solution of sulphurous acid, or by adding " sulphite of soda to chloride of barium in solution," preferring the latter method. "The sulphate of barytes, which is obtained " as a white precipitate, is mixed with rice or other small-grained " starch, and the mixture either in this state or after being dried " is added to paper pulp, as described.

Second, "the use of sulphate of barytes, which is mixed in the " recently precipitated and still moist state with some small " grained starch, as in the preceeding case." " The sulphate of " barytes is produced by adding sulphuric acid or sulphate of soda " to chloride of barium, and then mix one part of the precipitate " before drying it with about ten parts of starch, estimating both " in the dry state. This mixture may be added to paper pulp." " The sulphate and sulphite of barytes may be used together, as " above."

Third, " the use of sulphate and sulphite of barytes mixed with " *starch,* as already described, in the sizing of paper." One pound of the powder is mixed with two gallons of boiling water, and one part of this is added to about " four parts of animal size, " such as is usually employed in the sizing of paper."

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 13.—N° 1448.

SPENCE, William.—(*A communication from George E. Vanderburgh.*)—" Improvements in the mode of and apparatus for reduc- " ing silicious substances to a fluid state." These are, first, " the " reduction of silicious substances to a liquid state by first incor- " porating therewith a comparatively small proportion of some " alkaline substance, and then subjecting the same to the direct " action of superheated steam whilst enclosed within a suitable " vessel," as follows:—The digesting chamber is of a cylindrical form and is composed of double sides and double ends. The ends have an aperture in the centre, through which hollow shafts are passed working in stuffing boxes; a pipe passes through the hollow shafts through which the superheated steam passes into the digester, and is discharged therein through slotted pipes at the end of radial arms, so as to act directly on the composition as it is raised by revolving elevators. Steam is admitted into the spaces between the double sides and ends of the digester. The digester is provided with a man-hole at the top, &c. The silicious substance employed is usually " clean sand, and the alkaline substance " employed is usually commercial potash or soda. But instead of " sand silicious stones may be employed " after reducing to a proper fineness. The proportions of the silicious and alkaline substances employed are " about 85 per cent. of the former to 15 " per cent. of the latter."

Second, " the application of the same to the various purposes " to which it is applicable," several of which are specified.

[Printed, 8*d*. Drawing.]

A.D. 1860, June 14.—N° 1454.

HENRY, Michael.—(*A communication from Louis Henry Obert, Jean Baptiste Vasseur, and Auguste Houbigant.*)—" Improvements " in treating vegetable substances so as to obtain paper pulp and " other useful products therefrom." Among these products are named acids, oils, &c. The substances are, first, crushed and drawn, or combed out, and " soaked or steeped in a hot bath,

" composed of " carbonates or salts of soda, potassa, or lime," and submitted to steam in a close boiler, and sometimes distilled. " Electricity may likewise be employed as a means of disintegra- " ting the vegetable substances while undergoing the soaking " and the hot treatment, or even afterwards." The liquids " are " collected, in order to obtain from them the fecula, coloring, " tanning, and saponaceous matters which they contain." By this mode of treating plants " the constituents of the coloring " matters which have been hitherto discovered in coal may be " obtained from them, and hence phenic and picric acid, benzine, " nitro-benzine, aniline, and similar products may be manufac- " tured from the leys." The further treatment of these fibrous matters, as to decolorization, &c. is described. " Pamphyteic acid " is extracted from the saturated liquors withdrawn from the " boiler by treating them with nitric or other acid suitable for " that purpose, which is neutralized by distillation or evapora- " tion."

[Printed, 1*s*. Drawing.]

A.D. 1860, June 16.—N° 1467.

MOULE, JOHN.—" An improved self-acting apparatus for pre- " cipitating and collecting from solutions metals and their salts, " part of which apparatus is applicable to flushing purposes." For this purpose three vessels are used, " one of which is divided " into two compartments, one larger than the other, the largest " for receiving a regulated quantity of the metallic solution, the " smaller one for containing the precipitating agent, which are " brought into contact in suitable proportions by the action of " floats effecting the opening and closing of valves in the separate " compartments. The liquid and precipitating agent is run off " into a second vessel or reservoir, and from thence to the third " vessel, which is supplied with a suitable filter which effects the " separation and collection of the metals and salts." " The self- " acting apparatus for discharging the contents of the first vessel, " and which is applicable to general flushing purposes, are as " follows:"—Using a balanced lever supported in the centre by a pillar or bracket, to one arm of which a float is connected, and also by a chain or otherwise the valves, which require to be opened at the bottom of the vessel. " The float is of sufficient weight and " *size* that when acted on by an accumulated height of water " *or other liquids* shall have buoyancy enough to lift the valves."

To keep the valves open and allow the contents of the vessel to escape, to the other arm of the lever a floating bracket is connected, which, when empty, is lighter than the float. The bracket is provided at the bottom with a cock for discharging itself. Another arrangement is fixing on the side of the vessel on a level with the liquid a supplementary reservoir or bucket with a cock at bottom, in which is suspended from one arm of a lever a float, to which arm is also connected the valves at the bottom of the cistern to be discharged. At the opposite arm is a sliding weight.

[Printed, 10*d*. Drawing.]

A.D. 1860, June 18.—N° 1480.

KEATES, Thomas William.—" An improved mode of separating carbonic acid gas from the gaseous products derived from " the distillation of peat and other vegetable matter." The mixed gases as they pass from the retort are first cooled in the usual way by being passed through some form of condenser, and are then conducted to a purifier containing oxide of iron for the purpose of separating therefrom the sulphuretted hydrogen and the sulphides that may be contained therein. The mixed gases thus partially purified are conducted into a vessel containing acetate or other soluble salt of lead, which substance having a strong affinity for carbonic acid absorbs that gas and is converted into carbonate of lead (white lead), leaving the heating or illuminating gas free from carbonic acid.

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 19.—N° 1483.

ARROTT, Alexander Robertson.—(*Provisional protection only.*)—" Improvements in the manufacture of carbonate of soda." These are, producing " crude soda or black ash from salt cake or " sulphate of soda by using a smaller proportion of limestone or " chalk than is generally used for this purpose, by which a saving " of limestone or chalk is effected, and the 'waste' remaining after " the extraction of the carbonate" by " lixiviation is of such a " composition that on adding to it hydrochloric acid sulphuretted " hydrogen is evolved in a sufficient pure state for burning for the " production of sulphuric acid in the leaden chambers used for " this purpose." " The combustion of sulphuretted hydrogen " for this purpose from ordinary 'waste' has hitherto been un-

" successful owing to the large quantity of carbonic acid evolved " along with the sulphuretted hydrogen, and also because the " hydrochloric acid produced in the manufacture of the quantity " of salt cake or sulphate of soda converted into carbonate of soda " or black ash is insufficient to decompose the whole of the waste " produced, owing to the excess of limestone or chalk used in the " production of the black ash." In the ordinary process 75 to 100 parts of limestone or chalk are mixed with 72 parts of salt cake or sulphate of soda and about 54 parts of coal, and the whole fused in a reverberatory furnace. By this process 50 parts of limestone or chalk and 72 parts of salt cake or sulphate of soda are fused together, and while in a state of fusion about 54 parts of small coal stirred into the mixture, or the fused mixture may be withdrawn from the furnace granulated and mixed with coal, and worked in the same manner as common black ash.

[Printed, 4*d.* No Drawings.]

A.D. 1860, June 22.—N° 1522.

WILSON, John.—(*Provisional protection only.*)—" Improvements in the manufacture or production of sulphur or brimstone, sulphurous acid, and sulphuric acid." These are, " distilling or calcining aluminous schist or alum shale in close " retorts or chambers."

[Printed, 4*d.* No Drawings.]

A.D. 1860, June 26.—N° 1554.

FLETCHER, John.—" Improvements in the apparatus for " treating saccharine and saline solutions." These are, an evaporating apparatus for treating the above solutions, consisting of a " cylindrical metallic vessel having an opening at " each end, and fitted with trunnions or axes running on rollers. " It is fitted internally near its circumference with a number " of longitudinal metallic tubes communicating with a second " or steam cylinder enclosing the first." Steam is introduced into the second cylinder, and a pipe carries off the condensed steam. When the cylinder is filled about one-third with the solution to be evaporated, steam is admitted into the steam cylinder which passes thence into the tubes. The apparatus is then caused to rotate slowly on its trunnions and becomes exposed to the action of a current of air passing through the apparatus, and which is increased by means of a jet of steam placed in a chimney in communication with one of the apertures in the inner cylinder. "The steam cylinder may be fitted with a "third casing or cylinder, perforated at one end at intervals "round its circumference for the admission of air, the other end "being furnished with an aperture having a cover, there being in "this case no admission of air into the apparatus except by the "perforations in the end of the said cylinder." "The cooling "apparatus consists of a series of metallic pans or troughs placed "or encased in one common receptacle of metal, so as to have a "space for freely circulating cold water, or cold air," or both, round their sides and bottom. In place of the ordinary pump is a chain and bucket pump, consisting "of a framework with a "toothed wheel at each end, over which two endless chains are "placed, so that by turning one pair of wheels the chains are set "in motion." "Attached to the chains is a series of tilting "buckets. The bucket frame is lowered down to the bottom of "the vessel" by suitable gearing.

[Printed, 1*s.* 4*d.* Drawings]

A.D. 1860, June 28.—N° 1563.

BINKS, Christopher.—(*Provisional protection only.*)—"Improvements in manufacturing oxygen gas." These are, "effecting the decomposition of water free or combined, or in its ordinary "form, or in that of steam, through the agency of chlorine mixed "with or brought in contact with it under a high temperature, "and the conjoint action of any substance or substances capable "of retaining or of fixing by combination or otherwise the "hydrochloric acid formed by the reactions between the hydrogen "of the water and the chlorine, but not capable of retaining or "fixing the oxygen which is thus set free in its gaseous form."

[Printed, 4*d.* No Drawings.]

A.D. 1860, June 28.—N° 1564.

BINKS, Christopher.—(*Provisional protection only.*)—"Improvements in manufacturing chlorine." These are, decomposing "hydrochloric acid through the agency of oxygen gas "mixed with or brought in contact with the hydrochloric acid "under a high temperature, and the conjoint action of any "substance or substances capable of retaining or of fixing, by

" combination or otherwise, the water formed by the reactions " between the oxygen and the hydrogen of the hydrochloric acid, " but not capable of retaining or fixing the chlorine, which is " thus liberated in the gaseous form."

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 30.—N° 1586.

LAMING, Richard, and SMITH, Charles. — " Improve-" ments in purifying certain gases and liquids from sulphuretted " hydrogen." These are, first, with respect to oxides of manganese, purifying from sulphuretted hydrogen, first, the gases obtained by distilling coal and similar matters, and secondly, gas liquors and similar solutions by the agency of native or artificial oxides of manganese reduced to powder by mechanical means, "afterwards described, or of oxides made by heating the " artificial carbonate (as described, in No. 11,944) conjoined with " repeated use of the oxide which is produced in an effective " condition by exposing to the air at atmospheric temperatures or " thereabout the metallic sulphide which results from each puri-" fying operation." Also the purification of the same gases by the said mechanically prepared oxides when it is done simultaneously with the use of oxygen gas, or atmospheric air mixed with the gases preparatory to their purification." In this case the sulphuretted hydrogen which is to be withdrawn from the gas is " accompanied into the purifying vessels by about its chemical " equivalent of oxygen, either as oxygen gas or as atmospheric " air."

Second. "The use of elutriated oxides of iron in contradis-" tinction to those which are either reduced to the impalpable " state by precipitation from solution, or left by the unaided " process of grinding in the condition of gross powder, parts of " which latter are necessarily too coarse to be very effective," also the use " of oxides of iron generally when incorporated " mechanically while in a state of extreme division and in a wet " condition, in the absence of earthy matter with dry absorbent " materials, whereby their minute parts are prevented injuriously " contracting upon one another by age or becoming dry. The " claim extending in all cases to the said oxides after their " *revivifications*, although their chemical character or composition " *may have* become thereby changed."

It is stated that oxides of manganese and iron found ready made in nature, or as residues of processes in the arts, are not generally effective for attacking sulphuretted hydrogen, but they may be made so by the following means :—

The oxide intended for use is reduced to an impalpable powder, by grinding, in preference, in the wet way, the finer particles float away from among the grosser, and deposit separately in another vessel. The ground material is put into a tank and stirred up, the gritty particles of the oxide will have subsided in a few seconds, and the supernatant water is run off into a second tank placed at a lower level, where suspended matter soon deposits. This deposit, in preference, is mixed " while wet with as much dry " sawdust, or other convenient absorbent matter, as will give to " the resulting mixture the form of a damp, granular, and porous " mass." The gases and liquors are purified with this mixture, and the resulting sulphurets are revivified by exposing them to the air. It is proposed " sometimes to mix with the eleutriated " oxides of iron, when to be used for purifying the gases, whether " alone or made into a porous mass, about five per cent. of slacked " lime or chalk, in order to impede their gradual conversion into " the less useful subsulphate of the metal, during the process of " revivification."

[Printed, 4*d*. No Drawings.]

A.D. 1860, July 2.—N° 1591.

NICHOLSON, EDWARD CHAMBERS.—(*Provisional protection only.*)—" Improvements in the manufacture of a peroxide of lead " having peculiar oxidizing properties." These are, " submitting commercial oxides of lead, such as litharge or red lead in " a fine state of division, to the combined action of atmospheric " air and steam in a suitable apparatus." The oxides are " exposed to a temperature of from 575° to 600° F., for a space of " from 48 to 60 hours, or longer if necessary," and are " stirred " during such exposure," the air and steam being at such temperature. " The product is a brown powder, having very " energetic oxidizing properties."

[Printed, 4*d*. No Drawings.]

A.D. 1860, July 3.—N° 1608.

RICHARDSON, THOMAS.—" Improvements in purifying coal " gas." These are, " the use of finely divided iron, either alone

" or mixed with any of the substances described, for purifying " coal gas." The substances described are " about three times " its own bulk of sawdust, charcoal powder, small coke, or any " other porous material;" or " with sifted slaked lime, or the " lime and magnesia obtained by burning magnesian limestone, in " the proportion of 1 part of these earths to 3 parts of the finely " divided iron," or with " 1 part of finely ground gypsum, or 1 " part of rough Epsons with 3 parts of the iron powder." The iron powder is obtained by taking " cast-iron cylinders about " three feet long, with a rim of about four inches thick, and a " bore of about one inch in diameter, and place them vis-a-vis in " a lathe," and " bring the surfaces of the rims in contact, and " grind the iron to powder, while the cylinders are making 500 to " 1,000 revolutions per minute; or it may be obtained from the old " metal tubing, which has been used in pit shafts, or old metal " from any other source of a similar character, which is sufficiently " soft to be reduced to powder by grinding, or it may be obtained " bysifting the iron produced in fitting shops, in the filing, turning, " or boring operations, through a sieve with about 1,000 holes to " the inch." It is moistened with water, and may be mixed with the above materials, and the mixture " placed on trays of the " ordinary dry lime purifiers." When the material " has become " impaired by the saturation of the iron by sulphur," it is submitted " to a strong red heat in a close furnace so as to drive off " the impurity, and the residue is again fit for further use."

[Printed, 4*d*. No Drawings.]

A.D. 1860, July 7.—N° 1640.

LESLIE, John.—" Improvements in the manufacture of gas." These are, in place of the gas " being conducted off from the " upper part of the retort, and thence into the hydraulic main," it " is caused to descend from the retort at the lower part thereof " into a chamber, and thence the gas is conducted off by a pipe " at the upper part of the chamber to purifyers." In reference to this subject, the gas is purified by " a solution of a salt of " copper, preferring the sulphate, is employed to saturate wood " shavings or other porous material, through and amongst which " the gas is caused to pass." The purified matters thus employed are " from time to time to have streams of atmospheric

" air passed through them" for "being again and again used" for the purifying of gas.

[Printed, 4*d*. No Drawings.]

A.D. 1860, July 9.—N° 1647.

TOWNSEND, JOSEPH, and WALKER, JAMES.—(*Provisional protection only*.)—" Improvements in obtaining sulphur, sulphite, " and hyposulphite of lime and oxide of manganese from bye or " waste chemical products." These are, lixiviating the soda waste with water and mixing the solution " with chloride of manganese " liquor which has been previously freed from iron;" " the proportions as a general rule are about 9 gallons of waste liquor of " sp. gr. 1·05 to 1 gallon of manganese liquor sp. gr. 1·20; as a " rule it is preferred to have the mixture slightly alkaline;" the precipitate " consists of free sulphur and sulphide of manganese," which is " collected, drained upon filters, and cut into cubes of " two or three inches, which are dried at a temperature not exceeding 212° F.," are ready for use in " the manufacture of " sulphuric acid" in apparatus " ordinarily employed in burning " pyrites." The residue consists chiefly of " oxide of manganese " with a trace of sulphur." " For the production of sulphite and " hyposulphite of lime the solution from the soda waste is " evaporated to dryness, and then burned in a furnace, the " residual mass being the product desired." Or " the solid lye " or waste products are treated by boiling or agitation with the " soluble salts of manganese, so as to produce a similar precipitate " to that obtained by solution alone."

[Printed, 4*d*. No Drawings.]

A.D. 1860, July 18.—N° 1744.

JOHNSON, JOHN HENRY.—(*A communication from Louis Henry Obert*.)—" A new colouring matter, and the means for obtaining " the same." The new colouring matter is of a yellow tint, and is styled " panphiteic" acid; substances coloured by it assume shades of grey when subjected to a bath of a decoction of logwood, with or without an alkali. The greys are slightly changed by acids, but recover their tint when treated with alkalis, and are heightened in tint by the action of sulphuric acid and alkalis. The new acid is obtained by treating vegetable substances either in a divided state, or a decoction or infusion of the same, with concentrated or diluted nitric acid, alone or in conjunction with other mineral acids, such as sulphuric or hydrochloric acids. The substances which yield this colour are leguminous plants, more particularly lucern, which contain a stiptic or astringent principle, and the decoction of which has no effect upon salts of iron; from esparto, in which case the yellow, by the addition of prussiate of potash, assumes a blue tint; male and female flowers of the alder, and generally all vegetables which contain a tannin capable of producing other than a blue colour when brought in contact with salts of iron, and which will produce a black colour when mixed with logwood and salts of iron.

[Printed, 4*d*. No Drawings.]

A.D. 1860, July 19.—N° 1748.

JOHNSON, John Henry.—(*A communication from Georges Hyacinthe Ozouf.*)—" Improvements in the manufacture or pro-
" duction of white lead, and in the machinery or apparatus em-
ployed therein." These are, " according to the first and second
" systems," forcing " simultaneously by the aid of pressure or
" otherwise, the neutral tribasic acetate of lead and carbonic acid
" gas " into a vessel with an agitator. " Various means may be
" adopted for effecting the simultaneous introduction " of the substances into the vessel and for " agitating or mixing the same,
" as also for the production of the carbonic acid gas." It is stated here that the carbonic acid gas may be prepared in a manner similar to that which is adopted in the production of aerated liquids. According to the third system, it is proposed to introduce " the carbonic acid gas under pressure into a closed vessel
" filled with the neutral tribasic acetate of lead, which is intro-
" duced into this vessel as fast as it is required by means of a
" pump or otherwise, the intimate admixture of the gas and the
" solution of the tribasic acetate of lead being accomplished by
" any suitable agitator." Adopting a drying apparatus consisting of a hopper over a hollow cylinder provided with a cover and turning on a hollow axis through which steam or hot air is introduced, " or it may be heated by a number of gas burners."

[Printed, 8d. Drawing.]

A.D. 1860, July 19.—N° 1752.

STENHOUSE, John.—(*Provisional protection only.*)—" Im-" provements in purifying coal gas." These are, in " purifying " coal gas by sulphuret of carbon, by treating the gas with spirits " of wine (ethylic alcohol), or with wood spirit (methylic alcohol) " or with fusil oil (amylic alcohol). Also, " solutions of potash " soda, and ammonia, with their sulphurets and carbonates, dis-" solved in the before-mentioned alcohols," employing " these " solutions either singly or in combination; likewise adding to " these alcoholic solutions rectified coal tar, naphtha, the oils of " coal tar, and any other suitable liquid hydrocarbons or essentia " and fixed oils." The gases are treated " with these liquids by " means of the well known apparatus called a washer," or otherwise. " The bisulphuret of carbon is absorbed by these liquids " forming the well known series of acids, namely, the xanthic, the " xanthomethylic, and xanthamylic, and if alkaline bases are " present the common salts of these acids containing potash, soda, " and ammonia, are produced. When these liquids have ceased " to absorb, or have become saturated with bisulphate [bisul-" phuret ?] of carbon, they are removed from the apparatus, and " by cautious rectification, advantage being taken of the difference " in volatility of the alcohols and bisulphuret of carbon, these " substances are separated from each other, and thus the greater " portion of the spirits and bisulphuret of carbon are recovered." " When alkaline solutions are employed it is necessary to " neutralize the alkalis with acids before beginning to rectify, and " in this way the greatest portion of the alkali is also recovered."

[Printed, 4*d*. No Drawings.]

A.D. 1860, July 24.—N° 1788.

MACAIRE, Louis Cyrus.—(*Provisional protection only.*)—" A substitute for nitrate of silver, particularly applicable to " photographic purposes." This consists as follows:—Pure silver, one part; nitric acid, one and a half parts; azotate of potash, one and a half parts; and zinc or other metal, one tenth part.

[Printed, 4*d*. No Drawings.]

A.D. 1860, July 26.—Nº 1816.

GÉLIS, Amédée.—"Improvements in preparing compounds of "cyanogen, and principally of prussiates, by means of sulphuretted carbamids or amids, which supply sulphurets of carbon "by their decomposition." These are, "the exclusive right of "preparing prussiates by means of sulphocyanides or equivalent "bodies, whatever may be the source they are derived from, and "whatever the manner in which ammonia or azote is brought "in relation with the charcoal and sulphur in order to its production." The "sulphocarbonate of ammonia" is first prepared by agitating in a cylinder "a mixture of monosulphuret of "ammonia & of caustic ammonia in a concentrated solution with "sulphuret of carbon," adding any oil "in the proportion of "one to three per cent. of the weight of sulphuret of carbon," this addition of oil assisting the combination of these materials; applying heat from 90° to 100° centigrade, "a colorless, or but "slightly colored liquid remains, containing only sulphocyanide "of ammonium," to be afterwards dealt with, and "sulphohydrate of sulphuret of ammonium and monosulphuret on the "other hand, which is distilled" off and condensed, and may be treated with a fresh quantity of sulphuret of carbon as before, so as to obtain a fresh supply of sulphocyanide. The sulphocyanide of ammonium is converted into a sulphocyanide of potassium or sodium by distilling it with a sulphuret or carbonate of these bases, condensing the ammonium sulphuret which distils over. The sulphocyanide is next transformed into the cyanide by fusing it with iron cuttings, by which sulphuret of iron insoluble in cold water is obtained. To form a prussiate of potash and iron the cyanide is digested on the sulphuret or on iron. Sulphocyanides are obtained "from the washing or refining matters" in purifying gas. Sulphuret of ammonium is distilled with caustic or carbonate of soda. Caustic or carbonate of ammonia is evolved, sulphuret of sodium remains, which is evaporated to dryness, and saturated with sulphurous acid produces hyposulphite of soda. The residues in the process, namely ammonium sulphurets, are filtered through sawdust mixed with oxide of iron, and caustic ammonia obtained; "when a large quantity of sulphur "mixed with oxide of iron renders the latter inactive," the *mixture* may be roasted for sulphurous acid, or for extracting

" the sulphur by heat and liquefaction, or, which is better, ex-" tracting by employing the sulphuret of carbon."

[Printed, 6*d*. No Drawings.]

A.D. 1860, August 6.—N° 1898.

SEITZ, Adolph Julius.—(*A communication from Adolph Seitz.*) —(*Provisional protection only.*)—" An improved manufacture of " artificial sulphate of baryta." This consists in bringing together natural " sulphate of baryta mixed with coals," and " chlorine still liquor (refuse in the manufacture of bleaching " powder), of which the acid excess is neutralized with witherite " (natural carbonate of baryta)," and heating them to a high temperature " it forms a solid ball composed of chloride of barium, " hyposulphide of baryta, sulphuret of manganese, and iron," which is " exposed to the air, and then dissolved in the same " manner as soda balls " gives a solution of chloride of barium, which when " purified in the simplest manner," sulphuric acid is added. There is formed " in this manner a fine precipitate of sulphate of " baryta," leaving " weak muriatic acid."

[Printed, 4*d*. No Drawings.]

A.D. 1860, August 8.—N° 1913.

WEBSTER, James.—" Improvements in the manufacture of " prussiate of potash and Prussian blue." These are, first, the use of " bark, wood, sawdust, or spent bark with oxide of iron " or other like iron, and the passing of ammoniacal gas through " and into it after it has been charred or burned, and charged " with the carbonate of potash."

Second. Manufacturing " ammoniacal gas with sulphate of " ammonia, lime, and water, for the manufacture of prussiate of " potash and Prussian blue," by passing it into the above mixture when " charred or burned, and charged with the carbonate " of potash."

[Printed, 6*d*. Drawing.]

A.D. 1860, August 13.—N° 1951.

POUSSIER, Constant Pierre Eleonore. — " Improve-" ments in the manufacture of alcaline or other bichromates." These are, first, treating the " oxide of chromium, whether the " mono or bihydrated, or even the anhydrous," " (provided the "latter has not been previously calcined to a red heat) with an "alkaline nitrate, or with a combination of such salts yielding such "nitrate by double decomposition, the said alkaline nitrate being "caused to act on the oxide of chromium either alone or conjointly "with a carbonate or a hydrate of the same basis as that of the "alkaline nitrate."

Second. "Treating a neutral chromate in conjunction with "nitric acid with equivalent proportions of hydrated oxide of "chromium."

[Printed, 4*d*. No Drawings.]

A.D. 1860, August 13.—Nº 1956.

STUART, James.—"Improvements in treating hydrocarbon "oils." These are, subjecting those oils "to the action of "solutions of chromic acid, by which the odour is removed and "matters separated therefrom." "It is usually most convenient "to employ the bichromate of potash. This is dissolved in water, "and the sulphuric acid added in certain proportions and agitated with the oil. The chromium used in the process may be "recovered either as sulphate or oxide, as desired. The sulphate "of potass formed may also be recovered."

[Printed, 4*d*. No Drawings.]

A.D. 1860, August 16.—Nº 1985.

ETRIE, William.—"Improvements in the manufacture of "sulphuric acid and in apparatus employed therein, parts of "which improvements are applicable to the obtaining of draught, "to the condensing of gases, and to the constructing of flues." These are, first, forming columns the lower part of which are contracted, and the central part of the bottom rises dome-shaped. There is an intermediate piece cemented into a socket forming the upper circumference of the bottom piece. There are test pipes through the column for taking samples. There are internal rings supported by internal flanges "forming parts of the bottom "piece and the intermediate piece respectively."

Second, the formation of the dome or cover in two concentric parts, and the inflow tube or funnel formed so as to drop its liquor from a number of places upon a flange slanted so as to shed the liquor into shoots or troughs, which distribute the liquid, or the liquid falls into a conical plate with holes.

Third, "the hermetic jar or cistern for causing an equable flow " of liquor where required in the manufacture of sulphuric acid, " or for other purposes," consisting of a vessel with an air-tight " cover at top, and fitted with two cocks having their orifices at " different levels and dipping into the liquid."

Fourth, "obtaining a draught by a steam blast, consisting of a " jet working through the axis of a tube."

Fifth, "for leaden chambers or lobbies working in any ordinary " manner," the application of the steam jet "composed of the " usual metal pipe secured in a nozzle of stoneware or earthen- " ware, conical externally and internally to the extreme orifice; " also the protection of lead work containing coke with sul- " phurous and nitrous gases, by employing a smooth material, " being a non-conductor of electricity, to keep the coke out of " contact with the lead."

Sixth, "the application of slanting or inclined bottoms in " leaden evaporating vessels."

Seventh, the "reverberatory evaporating bank, being the " combination of a series of evaporators having the liquor passing " successively from the colder to the hotter end, where it flows " out," &c.

Eighth, constructing of "boilers to complete the concentration " of sulphuric acid." Two cones are united "in one and the same " circumferential base. One truncated forms the sides, and the " other, of thicker material and more obtuse, preferably truncated " near its apex by a plane circle united to it, forms the bottom." The vessel is made of platinum hardened by an alloy, and gilt, &c. The vessel is set on a circle, in preference of fire-brick, with water in the ash-pit. The products of combustion rise at one side, pass around the sides, and are preferably led to other apparatus. The inflow and outflow are by tubes the bottoms of which "are " protected by a small shield adapted to them so as to prevent " bubbles of sulphuric acid vapour from casually rising into these " tubes."

[Printed, 1*s*. Drawing.]

A.D. 1860, August 28.—N° 2075.

CALVERT, Frederick Crace.—(*Provisional protection only.*) —" Collecting and saving certain products given off or emitted " during the manufacture of coke." This is effected, first, by conducting the mixture of heated and ignited gaseous products obtained from the distillation of coal in an oven or ovens of a peculiar construction underneath and around another oven or ovens for the purpose of effecting by the heat thereof the distillation of the volatile gaseous liquid and solid products from the coal therein contained.

Second, "conducting the gases and other volatile products pro-" duced in the second oven through flues and columns" fitted with "perforated shelves, through and over which a thin stream " of weak acid is allowed to percolate" for the "purpose of col-" lecting the ammonia and other condensable products."

[Printed, 6*d*. Drawing.]

A.D. 1860, September 4.—N° 2132.

STANDLEY, Henry John.—(*Provisional protection only.*)— "Improvements in the production of gas for illumination and " other purposes, and the utilization of the products arising " therefrom." The invention relates to the treatment of "the " nitrates and other compounds of soda, potassa, and other alka-" line salts," and also of the residuum left after extracting the oxygen gas therefrom. This is effected by "combining with the " salt employed (in the retort) a metallic base, as iron, zinc, or " other metal, and also in passing the oxygen gas evolved from " the salt through a lixivium or solution of the residuum remain-" ing after the salt has been deprived of so much of its oxygen as " will be disengaged by a moderate heat (which residuum I obtain " from a previous charge), by which it is freed from other gases " which have passed over with it from the retort, and which latter, " combining with the solution, forms a precipitate (the nature of " which is dependant upon the character of the metallic base em-" ployed in the retort), which, after having separated it from the " liquid part of the solution, I convert, by washing and filtration, " into a useful pigment; and I further cause the liquid part of the " solution, which contains alkaline matter, to be evaporated, from " which I obtain a caustic alkali. This operation may be re-" peated for the continuous productiou of the products before " named. I further effect the complete purification of the oxygen " gas, when the production of the two products before named is " not required, by simply dissolving the product of the evaporated " solution last named in water, through which I pass the oxygen

" gas evolved from the salt, so that any nitrous or other gaseous
" product passing over the oxygen gas may be arrested in its
" passage; the receiver, and the residuum left in the retort, I
" treat as before stated, obtaining the before-named useful pro
" ducts in addition to the oxygen gas."

[Printed, 4*d*. No Drawings.]

A.D. 1860, September 4.—N° 2134.

WHEELER, George Printy.—" An improved mode of and " apparatus for preparing bleaching agents." The object of this invention is to effect an important economy in the manufacture of the bleaching agent known as " oxymuriate of lime," used in bleaching textile fabrics and vegetable fibres. A leaden retort is set in a closed water tank and connected by a leaden pipe with a conical leaden receiver, which is closed at top and provided with a central vertical shaft carrying blades or arms for agitating the contents of the receiver. The retort has further a water joint to receive the lid and a funnel fitted into the lid. A steam pipe is fitted to the water tank. The retort having been charged with a mixture of black oxide of manganese and common salt moistened with water and covered in, the receiver is next charged with well sifted slack lime and an agitator set in action. Dilute sulphuric acid is then discharged into the retort through the funnel, in such quantities as to make the generation of the gas in the retort slow and continuous. This gas finds its way by the coupling pipe to the receiver, and acts upon the lime therein contained, and a shower of water is discharged into the receiver while the gas is thus acting. After some hours, when the generation of gas slackens, steam is turned into the water tank and the chemical action of the materials therein is quickened. As soon as the gas ceases to go over, the contents of the receiver are discharged into a closed cistern and the lime allowed to precipitate. The clear liquor being then drawn off it is ready for use as a bleaching agent.

[Printed, 8*d*. Drawing.]

A.D. 1860, September 11.—N° 2193.

CLAPHAM, Robert Calvert—" Improvements in the manu-" facture of bleaching powder, and apparatus employed therein."

conducting the mixture of heated and ignited gaseous products obtained from the distillation of coal in an oven or ovens of a peculiar construction underneath and around another oven or ovens for the purpose of effecting by the heat thereof the distillation of the volatile gaseous liquid and solid products from the coal therein contained.

Second, "conducting the gases and other volatile products pro-" duced in the second oven through flues and columns" fitted with "perforated shelves, through and over which a thin stream " of weak acid is allowed to percolate" for the "purpose of col-" lecting the ammonia and other condensable products."

[Printed, 6*d*. Drawing.]

A.D. 1860, September 4.—N° 2132.

STANDLEY, Henry John.—(*Provisional protection only.*)—"Improvements in the production of gas for illumination and " other purposes, and the utilization of the products arising " therefrom." The invention relates to the treatment of "the " nitrates and other compounds of soda, potassa, and other alka-" line salts," and also of the residuum left after extracting the oxygen gas therefrom. This is effected by "combining with the " salt employed (in the retort) a metallic base, as iron, zinc, or " other metal, and also in passing the oxygen gas evolved from " the salt through a lixivium or solution of the residuum remain-" ing after the salt has been deprived of so much of its oxygen as " will be disengaged by a moderate heat (which residuum I obtain " from a previous charge), by which it is freed from other gases " which have passed over with it from the retort, and which latter, " combining with the solution, forms a precipitate (the nature of " which is dependant upon the character of the metallic base em-" ployed in the retort), which, after having separated it from the " liquid part of the solution, I convert, by washing and filtration, " into a useful pigment; and I further cause the liquid part of the " solution, which contains alkaline matter, to be evaporated, from " which I obtain a caustic alkali. This operation may be re-" peated for the continuous productiou of the products before " named. I further effect the complete purification of the oxygen " gas, when the production of the two products before named is " *not required*, by simply dissolving the product of the evaporated " *solution last* named in water, through which I pass the oxygen

" gas evolved from the salt, so that any nitrous or other gaseous " product passing over the oxygen gas may be arrested in its " passage; the receiver, and the residuum left in the retort, I " treat as before stated, obtaining the before-named useful pro " ducts in addition to the oxygen gas."

[Printed, 4*d*. No Drawings.]

A.D. 1860, September 4.—N° 2134.

WHEELER, George Printy.—" An improved mode of and " apparatus for preparing bleaching agents." The object of this invention is to effect an important economy in the manufacture of the bleaching agent known as " oxymuriate of lime," used in bleaching textile fabrics and vegetable fibres. A leaden retort is set in a closed water tank and connected by a leaden pipe with a conical leaden receiver, which is closed at top and provided with a central vertical shaft carrying blades or arms for agitating the contents of the receiver. The retort has further a water joint to receive the lid and a funnel fitted into the lid. A steam pipe is fitted to the water tank. The retort having been charged with a mixture of black oxide of manganese and common salt moistened with water and covered in, the receiver is next charged with well sifted slack lime and an agitator set in action. Dilute sulphuric acid is then discharged into the retort through the funnel, in such quantities as to make the generation of the gas in the retort slow and continuous. This gas finds its way by the coupling pipe to the receiver, and acts upon the lime therein contained, and a shower of water is discharged into the receiver while the gas is thus acting. After some hours, when the generation of gas slackens, steam is turned into the water tank and the chemical action of the materials therein is quickened. As soon as the gas ceases to go over, the contents of the receiver are discharged into a closed cistern and the lime allowed to precipitate. The clear liquor being then drawn off it is ready for use as a bleaching agent.

[Printed, 8*d*. Drawing.]

A.D. 1860, September 11.—N° 2193.

CLAPHAM, Robert Calvert—" Improvements in the manu- " facture of bleaching powder, and apparatus employed therein."

The invention has for its object to obtain from common salt an increased yield of muriatic acid suitable for making bleaching powder. "In condensing muriatic acid from the decomposition "of common salt, a large part of the muriatic acid has hitherto "been found to be of too low a strength to be applicable to the "decomposition of manganese in making bleaching powder, and "the object of the present invention is to render the above-named "weak acid, which usually varies in strength from 1° to 6° "Twaddle, commercially useful for the above object." The weak acid solutions, as run from the last condenser in the muriatic acid apparatus, are cooled and passed down "what is called No. 1 "condenser, or the strong acid condenser, commonly used when "decomposing common salt in place of water." The apparatus employed "resembles in principle that used in working Gay "Lussac's apparatus for saving nitrate of soda." It consists of a series of cooling cisterns made of Caithness flags, secured with suitable cement. From these a gutta percha pipe leads the solutions to an egg-shaped vessel, made of metal or wood and lined with india-rubber or gutta percha; or it may be made of thick sheets of gutta percha only. This latter vessel is attached to an ordinary air-pump, by which the liquid contents are forced through a gutta percha pipe or metal pipe lined with india-rubber, to a cistern on the top of No. 1 condenser, "whence a regular "supply of the acid solutions can be obtained as required by "means well known to manufacturers."

[Printed, 6*d*. Drawing.]

A.D. 1860, September 20.—N° 2296.

RICHARDSON, THOMAS, and PRENTICE, MANNING.—"Improvements in treating phosphotic matters and in obtaining "products therefrom." These are, treating substances "containing phosphate of lime with muriatic acid, by preference, in "excess in the cold state until all or nearly all the phosphate is "dissolved;" thus sepparating "the insoluble portion," and boiling down the acid liquor to dryness, heating the dry mass to redness, until on testing in the usual way, no phosphate is left in a state soluble in water, when extract all matters soluble in water, and "dry the phosphates, which can then be employed "as a manure, or for the production of super phosphate of "lime, or in the production of glazes in the manufacture of

" earthenware." Or sawdust or other organic driers are mixed with the acid solution, and the pasty mass is distilled in a clay retort until the phosphates are rendered insoluble in water, and "if necessary, remove any muriate of lime by washing " it in water." "The muriatic acid used in dissolving the " phosphatic matters is condensed and thus re-obtained when " boiling down and when heating to redness."

[Printed, 4*d*. No Drawings.]

A.D. 1860, September 21.—N° 2299.

RICHARDSON, Thomas. — (*Provisional protection only*.) — " Improvements in the treatment of bones and in the manufac- " ture of paper." These are, obtaining "from bones a diphos- " phate or subphosphate of lime in a state of fine white powder " or precipitate suitable for being employed in the manufacture " of paper in lieu of sulphate of lime or other white powders" as follows :—"The bones may be previously cleaned by steeping in " lime water and washing, and the larger bones may be crushed or " broken ; " they are supported in towers, and a stream of sulphurous acid obtained by any known means is caused to pass through the towers. "The towers are supplied with a current of water or of " weak solution from one of the towers." The heat must not be allowed to "rise so high as to dissolve the gelatine of the bones." " The liquid may thus be brought to a strength of fifteen degrees " of Twaddell's hydrometer," but in preference it is mixed "with " weaker solutions," and clean soft bones are digested in them " to absorb as much as possible of the free sulphurous acid," and the solution is evaporated or concentrated " until the diphosphate " of lime precipitates ; " or the solution is mixed "with as much " lime or magnesia, or their bicarbonates in solution, as will supply " another equivalent of these bases to combine with the sul- " phurous and phosphoric acids," and "collect the precipitated " sub-phosphates of lime, which are afterwards dried in the air, or " otherwise." The gelatine of the bones is washed, &c., the finest portions yield a "nearly colorless gelatine." The next "are " made into glue," and "the most impure portions are dried and " used in lieu of other naimal matter in the manufacture of " prussiate of potash."

[Printed 4*d*. No Drawings.

A.D. 1860, September 26.—N° 2342.

BUCHHOLZ, Ludwig.—(*Provisional protection only.*)—"Improvements in carbonizing sawdust and other finely divided "vegetable substances, and in obtaining certain useful products "by such carbonization, and in apparatus connected therewith." The sawdust, &c. is placed in a close vessel, to which steam is admitted by perforated pipes or otherwise, by which air and aqueous vapour or water are expelled; or the same are otherwise exhausted and driven off, and the carbonization carried on by heat from a fire. The apparatus used is a vertical retort, within which is a perforated vessel capable of being charged at top. At the lower end is a slide which opens an aperture for the discharge, and the charcoal then falls or is driven into a close chamber beneath. "The products I obtain besides the charcoal are, acetic "acid, acetate of lime, of soda, or other acetate, naphtha, and "gas for illumination and heating. In obtaining these or part "of them, I cause the gases or vapours given off during the carbonization to pass firstly into a lower vessel so arranged as to "condense and receive the tar; the remaining vapours then pass "upwards through a vessel containing lime or other base for an "acetate, and kept at a suitable temperature for arresting the "acetous vapour, but allowing the remainder to pass though a "worm or other refrigerator, where the naphtha is condensed, and "the gas for illumination or heating is then collected by ordinary "apparatus."

[Printed, 4*d*. No Drawings.]

A.D. 1860, September 29.—N° 2358.

GREEN, Charles.—(*Provisional protection only.*)—"Improvements in the manufacture of salt." These are, heating the brine for evaporation by means of gas to be burned in jets or burners under salt pans instead of coal fires." Also, "burning "the coke make at the gas works with gas jets in fire-places to be "made for the purpose under other pans. The form of the pans "and mode of conveying the gas to or under them may be "arranged according to the plan and convenience of the "premises."

[*Printed*, 4*d*. No Drawings.]

A.D. 1860, October 12.—Nº 2483.

WEST, John Aaron.—" Improvements in treating solutions " containing sulphate of soda, also metallic and other matters, and " in obtaining products therefrom." These are, obtaining " crystals of sulphate of soda (Gauber's salt) in order to the employment of such crystals in the manufacture of alkali, and generally " the manufacture of alkali from crystals of sulphate of soda " (Glauber's salt)," also obtaining " sulphate of iron, alum, and " other products," as follows :—

The solutions, after " treating ores and minerals containing " sulphur with common salt," are treated with metallic iron to precipitate copper, silver, and other metals, are set aside " to " crystallize in suitable vessels ;" the mother liquor is concentrated and crystallized " until exhausted of sulphate of soda or nearly " so," and the crystals dried. The mother liquor, after removal of the sulphate of soda, is set aside to crystallize, and " at various " stages crystals of sulphate of iron, chloride of iron, alum, and " other metallic products " are obtained. The last residual liquor is treated with sulphuretted hydrogen in order to obtain " sulphide " of zinc (and sulphide of copper if any copper remained in such " residual liquor), which can be reduced to the metallic state or " otherwise."

[Printed, 4*d*. No Drawings.]

A.D. 1860, October 15.—Nº 2503.

DAVIES, George.—(*A communication from Ferdinand Philippe Edouard Carré.*)—" An improved method of and apparatus for " refrigerating and freezing." An intermittent apparatus is described, " acting by means of a concentrated solution of ammoniacal gas in water, which, if not the most suitable agent, is, however, the most readily attainable." " The ammonical solution " is to be placed in a vessel hermetically closed, and capable of supporting a pressure of from eight to ten atmospheres at least, communicating at its upper part by means of a tube or tubes with " another vessel of a capacity four or five times less. The vessel " containing the solution is to be heated to about 120° to 130° F., " whilst the other is plunged into cold water ; the gas is set at " liberty, and becomes liquefied in the smaller vessel. When the " liquefaction or condensation is complete the vessel containing " the desaturated water is placed in contact with a sufficient

" quantity of cold water, and that enclosing the liquefied gas is " placed in contact with the liquor to be refrigerated or frozen." To "render the operation continuous, the vessel or boiler containing the ammoniacal solution should communicate with a worm " or tubular apparatus (constantly cooled by running water), in " which the gas will liquefy, and whence it will be directed into " an apparatus arranged for transmitting the cold produced to " the water or liquid to be refrigerated. The receiver containing " the liquefied gas will communicate with an absorbing vessel, " wherein the gas will be redissolved in water, which will serve as " a vehicle for transmitting it again to the first-named vessel or " boiler, which is effected by a pump actuated externally, or " rendered automatical by causing the gas from the boiler to act " against the piston; the water for the absorbing vessel should be " supplied from the boiler, and taken from the lower part of the " same, where it will be almost exhausted of gas. The exhausted " water and the saturated water should be caused to circulate in " opposite directions to exchange their temperatures in a tubular " apparatus, or in two worms concentrically one within the other, " so that the saturated water shall pass to the boiler at a temperature approaching that of the latter, and the exhausted or " desaturated water will arrive cold at the absorbing vessel; the " cooling of the latter can be further ensured by contact with cold " water before its arrival at the absorbing vessel, which should be " constantly cooled on account of the caloric disengaged by the " dissolution of the gas in the water." "The cold produced by " these means may be applied for the manufacture of ice, refrigerating or cooling liquids, air, and so forth, or to facilitate the " crystallization or precipitation of different chemical products, for " instance, the precipitation of sulphate of soda, from the mother " waters of sea salt, paraffine, and so on, or for the separation of " water from various salts or other bodies, which it leaves on congelation, such as the manufacture of fresh ice and salts from sea " water, or to moderate the heat produced during fermentation, " especially that of beer, wine, or vinegar."

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1860, October 17.—N° 2525.

HENDERSON, WILLIAM, and **DOWN**, JONATHAN.—" *Improvements* in obtaining copper, silver, tin, and several other " *metals from* their ores, or any other natural or artificial com-

" pound containing one or more of these metals." These are, first, "the employment of chlorides of iron, manganese, calcium, " sodium, potassium, and the other alkalies or alkaline earths, " either singly or in conjunction," as follows:—The ore or regulus, &c. is reduced to powder and calcined, or otherwise is mixed with from 5 to 25 per cent. of the above chlorides, and the mixture subjected to "a gradually increasing heat in a close cal-" cining furnace which communicates with a condensing appa-" ratus," "driving off chlorides of copper, iron, silver, and " other metals, if present," which are condensed and afterwards separated. "Nearly the whole of the copper is left in the furnace " free, or nearly free from silver."

Second, "the employment of nitrate of soda or potash or other " nitrate readily decomposable by sulphuric or muriatic acid" to " dissolve the copper from ores containing suboxide of copper, " metallic copper, or from sulphuret ores of copper that have been " previously calcined." The nitrate is mixed with the copper solution of sulphuric or muriatic acid; nitric acid gradually liberated dissolves the above.

Third, "obtaining muriatic acid and magnesia or alumina from " their chlorides, and the use of these compounds," as follows:—Magnesia is used to precipitate the copper from chloride solutions; the resulting chloride of magnesium is finally evaporated to dryness in a pan communicating with a condensing apparatus. "The " muriatic acid is readily driven off during the evaporation;" " the dry salt, if moistened by a jet of steam and again dried once " or twice, may be completely freed from muriatic acid," and " the magnesia may be re-used as a precipitant." "Chloride of " magnesia may be readily obtained in the first instance by dis-" solving equivalent weights of Epsom salts and common salt, " evaporating and crystallizing out the sulphate of soda. "The " mother liquor is chloride of magnesia." "The corresponding " salts of alumina may be substituted for those of magnesia."

Fourth, "the employment of dry flues or condensers, either " alone or in conjunction with a wet tower," for the purpose of condensing the volatilized chlorides. "Between the tower or wet " condenser and the furnace" are, "a series of flues or one very " long and capacious flue," which is dry, and in which "nearly " the whole of the sublimed chlorides deposit, and the perpen-" dicular wet condenser condenses the last traces and maintains " the draught."

Fifth, "the separation of silver from copper." "The dry "powder deposited in these flues" is treated with "dilute "muriatic acid, which readily dissolves the copper, iron, arsenic, "and other metals, leaving the silver as insoluble chloride." The copper is obtained "from these solutions by precipitation with "iron, lime, or other convenient precipitant," and the chloride of silver is reduced to the metallic state by "zinc and sulphuric "acid, or any other well-known means."

[Printed, 4*d.* No Drawings.]

A.D. 1860, October 19.—Nº 2557.

HUNTER, Andrew George.—"Improvements in treating "sulphurets." These are, "decomposing sulphurets of potassium and sodium, and converting them into oxides and carbonates of oxides, by means of steam, air, carbonic acid, and other "gases, and carbonating the so-formed oxide by means of carbonic acid or carbonaceous matter." The mixture of sulphuret and carbonaceous matter while "in a state of fusion" is removed into a previously heated vessel provided with pipes "for the "admission of steam, air, or other gases capable of supplying "either oxygen, hydrogen, or carbonic acid, in such proportions "as shall convert the sulphuret into an oxide or carbonate of "oxide without converting it into a sulphate, sulphite, or hyposulphite." In preference superheated steam is employed and forced "through and among the fused mass," until "the sulphuret is all or nearly all decomposed," and the product is purified by maintaining the mass in a fused state, and the impurities settled to the bottom are dissolved in water and the salts crystallized out, any undecomposed sulphuret having been previously converted "into sulphate by acting on the liquor with "nitre, as commonly practised." Should it be desired to convert a sulphuret into a carbonate, steam is used mixed with carbonic acid, but in preference the sulphuret is first formed into an oxide and the solution exposed to carbonic acid, or it is boiled down, mixed with sawdust or other carbonaceous matter, and roasted; effecting "the utillization or recovery of the sulphur evolved by any of "the means well known to chemists for this object." In the Provisional Specification processes are given for effecting this of which nothing is said in the Final Specification.

[Printed, 4*d.* No Drawings.]

A.D. 1860, October 22.—N° 2571.

BROOMAN, Richard Archibald.—(*A communication from Jean Baptiste Dureau.*) — "Improvements in apparatus for "evaporating and concentrating, specially applicable to the "manufacture of sugar." These are, in effecting "the evaporation and concentration of sugar, saline solutions, extracts," &c. "in a column to which the supply of liquor is continuous at a "low or high temperature, and in vacuo or not." The apparatus consists of a column or tube of some "suitable metal, placed on "a boiler or pan, and containing double plates or shelves, one "above the other the whole or nearly the whole height of the "column; communication is maintained between the double "plates by pipes extending somewhat above the plates; pipes are "provided for leading steam to each of the double plates. A "tube or pipe leading from the pan runs through the centre of "the column." The top of column, dome-shaped, communicates with a reservoir of the liquors. "The dome is provided with "water and acid valves and draw off taps, and the boiler with the "requisite appliances for evaporating and concentrating ap- "paratuses." The liquor which falls on to the first plate rises to a level with the top of the overflow pipes, by which it descends to the second plate, and so on "until it arrives at the bottom of "the column, where pipes lead it to the bottom of the pan. The "steam escaping from the plates and pan enters the central tube, "there to be conveyed to any desired spot for use or to a con- "densor." "In some cases a double pipe is employed in the "central part of the column, so as to leave an annular space "closed at its upper part between the plates and the steam "pipe." For sugar two serpentine coils are employed one above the other, and introducing slowly and gradually a liquor "suffi- "ciently dense not to dissolve the crystals which form in the "apparatus."

[Printed, 8*d.* Drawing.]

A.D. 1860, October 24.—N° 2597.

CHISHOLM, John, CHISHOLM, George, and KENT, Robert Thomas.—"An improved method of obtaining com- "pounds of nitrogen." This consists in "taking products of "combustion and subjecting them to the action of hydrogen "obtained in any desirable manner, or to the action of steam,

" decomposing the steam so that its hydrogen may act on the " said products, using in addition electric action or not, as " desirable." One method is as follows:—A retort or a series of retorts set much as gas retorts are nearly filled with coke or charcoal and brought to a high temperature, while "the products of " combustion to be operated on" are led through them; "super-" heated steam is then admitted in minute jets into the retorts" " at such a temperature as not to reduce that of the retorts." The steam is decomposed, the "hydrogen set free, which in a nascent " state combines with the nitrogen of the products of combustion, " and so forms ammonia, which is intercepted in escaping from " the retorts by a liquid or other agent placed in a vessel or ammonia chamber communicating with the retorts by pipes or " retort necks." "The waste products not so intercepted escape into the chimney." Old or refuse iron mixed with the coke accelerates the decomposition of the steam. "When the operation " has to be assisted by electric agency," a number of streams or currents of electricity are passed into the necks of the retorts. Another method is in place of steam admitting hydrogen into a chamber, in which are the products of combustion, by jets, opposite each of which is a metal knob; through these knobs electricity is continually discharged; the ammonia is condensed by water in the chamber. A third method is to pass the products of combustion and superheated steam together into a chamber through a screen of platina wire kept incandescent by an electric or voltaic current, "the products pass off into an ammonia chamber, where " the ammonia is taken up and the waste matters escape into the " chimney."

The cyanogen produced in obtaining ammonia as above "may " be separated from it," by passing the results of these processes " over a caustic alkali, such as compounds of potassium, sodium, " barium, strontium, or substances of that class, by which the " cyanogen will be taken up, and combinations effected forming " compounds of cyanogen." The products of combustion may be " freed from carbonic acid, previous to their entering the retorts, " by passing them direct from the fire over a hydrate of lime."

[Printed, 4*d*. No Drawings.]

A.D. 1860, October 26.—N° 2612.

COBLEY, THOMAS.—"Improvements in the manufacture of " white lead (meaning carbonates of lead)." These are, manufacturing "white lead (meaning carbonates of lead) from the " native carbonates of lead (ore), or from any readily oxidized " combination of lead or native oxides," by the following process, or "by the use of any analogous or similar known methods, and " by the use of analogous and similar known means:"—The roasted ore is treated with acetic acid of commerce either in a liquid or gaseous form. The gas is introduced by means of a pipe from an apparatus into a closed tank or vessel, which is divided into two compartments by means of a "perforated diaphragm upon which the roasted ore is placed, and which is kept " wet in order to condense the vapour." The quantity of acid should be in such proportions as to form a subacetate of lead. Brightening "acetate salts of lead" by means of animal charcoal by "filtration or otherwise." "The liquor obtained as before " described" is precipitated by means of carbonic acid, obtained from decomposing carbonaceous matters, or from bye products given off in the manufacture of silicate of soda from carbonate of soda, or of chloride of barium from carbonate, or by decomposing " limestone, marble, dolomite magnesite, or any other of the " alkaline carbonates," or from the carbonates or proto-carbonates of iron, &c. The carbonic acid is purified by passing through a solution of copper, and in preference is applied in a heated state. The liquor is allowed to percolate through a large holder, and meets the gas introduced at the bottom of the holder by a series of pipes. The excess of oxide in the subacetate is thrown down as carbonate and is collected, washed, and dried. The neutral liquor is digested with a fresh supply of roasted ore, subacetate is again formed. White lead for potters, &c. is made with pyroligneous acid of commerce as above.

[Printed, *4d.* No Drawings.]

A.D. 1860, October 27.—N° 2628.

HUNT, William.—(*Provisional protection only.*)—"Improve" ments in obtaining sulphur, or certain sulphur compounds, " from certain other sulphur compounds, and in obtaining car" bonic acid." These are, first, passing a current of steam into a retort or other close vessel in which a mixture of earthy sulphate (lime, baryta, and strontia preferred) and carbonaceous matter are heated to redness; sulphuretted hydrogen gas passes off mixed with carbonic acid. This mixture of gases may be used in the manufacture of carbonate of soda by being passed through sulphuret of sodium. Sulphur may be obtained from the sulphuretted hydrogen procured as above by mixing it with sulphurous acid; the sulphur is precipitated in fine powder and may be condensed in a chamber. "Or the sulphuretted hydrogen may be mixed " with air and burned so as to produce sulphurous acid, which " may be converted into sulphuric acid in the ordinary manner."

Second, "obtaining carbonic acid by heating native carbonate of " iron to redness in close vessels or retorts." The oxide of iron left "may be used to make iron from, or for any other purpose " to which it is applicable."

[Printed, 4*d*. No Drawings.]

A.D. 1860, October 30.—N° 2654.

NEWTON, William Edward.—(*A communication from Louis le Chatelier.*)—" Improvements in the production of alumina and " salts of alumina." These are, first, " sulphate of alumina, either " pure or ferruginous, neutral or acid, in the state of solution, " and as obtained directly from the treatment of argils by sul- ' phuric acid, or the lixiviation of burnt aluminous earths or " schists," is digested with " a quantity of magnesia equivalent " to the sulphuric acid, either free or combined with oxide of " iron," alumina precipitates " more or less mixed with oxide " of iron." This precipitate is separated, and the sulphate of magnesia in solution is crystallized. The oxide of iron is separated from the alumina by " processes already patented by the " inventor, the principal of which consists in forming aluminate " of soda, and afterwards extracting the alumina, if necessary" (N° 957, 1859?).

Second. In some cases baryta may be employed "in the same " way as magnesia." When carbonate of baryta is employed, it is ground and digested with the solution of sulphate of alumina, sulphate of baryta falls to the bottom, and the alumina and oxide of iron " will be obtained as a gelatinous precipitate floating on " the top of the sulphate of baryta," and is separated from it by decantation. Carbonate and sulphate of baryta, the latter first converted into sulphuret of barium, are converted into chloride of barium, and a solution of this latter salt, mixed with a solution of the sulphate of alumina, sulphate of baryta precipitates and chloride of aluminium, " more or less mixed with chloride of iron," is in solution, from which the iron may be precipitated “ by “ yellow prussiate of potash or any other equivalent re-agent.” This solution, evaporated to dryness and the residue calcined, yields alumina. Alumina hydrated may be precipitated from this solution by means of lime, magnesia, &c., &c. “ In the case “ where very ferrugenous sulphate of alumina has been operated “ upon, the solution of chloride may be concentrated, and most of the iron got rid of by the process ” described in N° 957, 1859. “ The alumina may be precipitated together with the oxide of “ iron ” by lime, or its carbonate, &c.; or the chlorides may be evaporated and decomposed at a red heat; “ in either case an “ artificial ore of alumina will have been formed as before for the “ preparation of aluminate of soda or other salt.”

Third. “ A solution of sulphate of alumina, either pure or ferru- “ ginous, neutralized if necessary by lime, baryta, soda, or alumina “ itself,” is “ mixed with a solution of marine salt,” and put into shallow pans, and cooled to “ a little above the freezing point of “ water,” sulphate of soda crystallizes out, and the solution contains chlorides of aluminium and iron, and also sulphate of soda and alumina and sea salt. The sulphuric acid may be got rid of by chloride of barium, oxide of iron, if in small quantity by prussiate of potash. The solution evaporated, and the residue calcined, and the sea salt washed from the alumina. The solution without any precipitation may be evaporated, and the residue calcined, there remains “ a very pure ore of alumina, fit for the “ manufacture of aluminate of soda, and its compounds.”

A mixture of sea salt and sulphate of alumina is “ calcined “ until the disengagement of hydrochloric acid has ceased,” the residue is lixiviated, solutions of sulphate of soda are obtained and crystallized, an ore of alumina remains applicable as above.

These artificial ores may be dissolved in hydrochloric acid “ for “ the production of chloride of aluminium by crystallization.”

“ The artificial ore may also be obtained by calcination ” “ from “ ferruginous sulphates of alumina, either direct or after ad- “ mixture with a small quantity of charcoal.”

Fourth. Making aluminate of soda as follows:—The artificial ore, or the natural ore of Les Baux, &c., pulverized, is mixed with soda ash of commerce, and made into a paste and introduced into a very hot oven or furnace, and calcined with agitation, the rough aluminate is lixiviated, and yields solutions of aluminates. “ In “ order to produce dry aluminate, diluted solutions may be em-

"ployed after some time, but it is advisable to use the concentrated liquors immediately;" the aluminate is evaporated in an iron pan, &c. with stirring, until it is granulated and finished at a bright red heat in a reverberatory furnace. "The residuum of "the lixiviation," when an excess of artificial ore has been used, will be oxide of iron, mixed with a small quantity of alumina. In the case of natural ores, "the residuum" is "hydrated oxide of "iron mixed with a small quantity of alkaline silico aluminate or "titanate of soda, and with the finest portions of unattacked "ore."

Fifth. The artificial or natural ore in powder is mixed with nitrate of soda or potash and calcined, "the nitrous vapours "evolved" are condensed, or may be conveyed into the leaden "chambers used in the manufacture of sulphuric acid." The residue "will be an alkaline aluminate, to be separated by "lixiviation."

Sixth. The ore is mixed with sulphate of soda, and alone or mixed with charcoal is calcined, sulphurous acid is evolved, the residue is lixiviated for the aluminate.

Seventh. Calcining "at a high temperature and under the "action of a current of steam (superheated if desired) an intimate "mixture of common salt with natural or artificial ore of alumina, "hydrochloric acid, carbonate of soda, or any other salt of soda, "and alumina may be obtained." Potash and its salts may be substituted for soda. Soda alum is obtained by saturating with sulphuric acid aluminate of soda.

[Printed, 6*d*. No Drawings.]

A.D. 1860, November 3.—Nº 2702.

SPENCE, Peter.—"Improvements in separating copper from "its ores." These are, the treatment of copper ores containing sulphur, iron, and a small quantity of copper, "with muriatic "acid, or sulphuric acid, and nitrate of soda, or with other com"bined substances acting upon the like principle," as follows:—The sulphur having been extracted from the ore in the usual manner, the ore is ground, so as to pass through a sieve of about 100 meshes to the square inch, but the fewer the better, and in preference it is calcined in a current of air at a low red heat. 1 cwt. of nitrate of soda of commerce is dissolved in 5 cwt. of muriatic acid of commerce diluted with twice its bulk of water, and poured over 5 tons of the crushed and calcined ore in a wooden vessel, stirring well into a pasty state, leaving it to digest for about 24 hours, after this the mass is well stirred up with water, which is drawn off when the insoluble matters have settled down. This solution contains a certain amount of copper, as muriate or sulphate. "The above operations may complete the process," but it is found that the copper is not entirely extracted, and therefore the ore is again calcined, and treated "as above described, using " however, this time, from one-third to one-half of the acid and " salt of soda." A modification of this consists in grinding the above ores, calcining them in furnaces, so as to economize the sulphur or otherwise, when " the metals are fully oxidized, which " is known by the powder when cooled assuming a reddish brown " colour;" the ore is then treated with muriatic acid and nitrate of soda, as above described. In place of muriatic and nitrate of soda, other substances may be employed, " as for instance sul" phuric acid and oxide of manganese."

[Printed, 4*d*. No Drawings.]

A.D. 1860, November 5.—N° 2708.

PRENTISS, Elijah Freeman.—" A new detergent." This is, " a solution of silicate of soda," with or without a small quantity of " common soap," depending upon the purpose for which it is used. To make the silicate, " soda ash free from salt," and clean white sand in certain proportions, or " a mixture of sulphate of " soda, charcoal, and white sand," are ground together and fused for a number of hours. " The fused part is then removed, and " immediately treated with cold water to soften it. It is then " crushed between rollers and ground, then dissolved in hot " water, and evaporated down to a consistency of 30° Beaumé, " and is then ready for use." This is added to hot or cold water in different quantities, depending upon the nature of the fabrics, &c. to be cleansed.

[Printed, 4*d*. No Drawings.]

A.D. 1860, November 5.—N° 2711.

WEBSTER, James.—(*Letters Patent void for want of Final Specification.*)—" Improvements in obtaining gas (mainly oxygen) " for improving artificial light and for other purposes; also for " utilizing the products resulting from its manufacture." To

" bring into practice my improvements, I use an iron or other " retort, in which I place nitrate of potash or other nitrates, and " submit the same to a bright red heat in a suitable furnace. A " small quantity of carbonic acid gas is first given off, which is " allowed to escape, after which nearly pure oxygen gas is generated with a small amount of nitric acid, which nitric acid may " be condensed in the usual way. The gas is collected by pipes " and receiver, without any further process, but may be passed " through lime water to free it from any impurities. After " the gas is collected, an alkali residue remains in the retort; " this residue is taken out and placed in the atmosphere to absorb " oxygen again; or steam may be blown into such residue to " replace oxygen for that which has been extracted; it is then " ready for use again; or the residue from the retorts may be " used for other purposes."

[Printed, 4d. No Drawings.]

A.D. 1860, November 6.—N° 2731.

COBLEY, Thomas.—" Improvements in the method of treating " poor ores of copper." These are, first, " the extraction of " copper and other metals from their ores by the simple calcination of the same," " with chloride of magnesium, or any substance containing chloride of magnesium in combination," and lixiviating, and also " for the application of magnesia made from the " native carbonate of magnesia, magnesite, or magnesian " spar," or " obtained by fusing the chloride of magnesium " liquors or leys," to precipitate the copper.

Second. In treating ores containing an excess of lime, in preference, " using an equivalent quantity of rock salt, so as to " make the residues of value for agricultural purposes."

Third. After precipitation of the copper by magnesia, the supernatant liquors are " again used, either for decomposing the " ore, or for a precipitant." Cobalt is precipitated with sulphuret of barium. Silver is precipitated by " cementation with " copper or such like."

Fourth. Economizing " any cupreous vapours which may " escape during the process." The furnace has two chambers connected by a flue or covered opening to carry off the products of volatilization;" the second chamber is filled with lixiviated ore, wet or some absorbent material, as sand, pebbles, &c. " The " resulting products are washed out by any available means."

[Printed 4d. No Drawings.]

A.D. 1860, November 8.—Nº 2758.

WESTHEAD, Edward.—(*Provisional protection only.*)—" Im-" provements in boiling or evaporating soap, saline solutions, or " other liquid substances." These are, " causing heated air to " pass into the fluid to be bodied or evaporated, and the said " fluid may at the same time, if desired, be submitted to the " usual fire or other heat."

[Printed, 4*d*. No Drawings.]

A.D. 1860, November 15.—Nº 2804.

RALSTON, William Henry.—" Improvements in the manu-" facture of soda ash." These are, " the separation and displace-" ment from the alkaline salts obtained by the concentration of " black ash liquor of the undecomposed chloride of sodium and " the unconverted sulphate of soda, producing thereby alkali or " soda ash for market, containing fifty-six per cent. of alkali " (soda) at the least when drained and finished," by using in preference a hot solution of carbonate of soda, but " in place thereof there may, however, be employed either the liquor obtained from the lixiviation of the black ash or other available liquor at the convenience of the manufacturer. " This liquor circulates through " a series of vats in which are the salts. Another mode" is to subject the salts to the action of steam in a closed vessel " under " pressure sufficient" to permeate through the alkaline salts continuing to do so " until the solution resulting from the con" densation of the steam, and which is drawn off as it is formed, " ceases to contain any appreciable quantity of chloride or sulphate " of soda."

[Printed, 4*d*. No Drawings.]

A.D. 1860, November 22.—Nº 2861.

RALSTON, William Henry.—" Improvements in the manu-" facture of hydrate of soda." These are, first, " if it is desired " to obtain a hydrate of great strength evaporating and separat-" ing the foreign salts, but in place of keeping the heat low, as " hitherto, the evaporation is continued and the heat raised until " the iron separates as oxide of iron, and until the oxide is " pre-" cipitated to the bottom of the vessel, the clear alkali is then " separated from the iron." " The alkali will be free from iron " and of great strength." If not required of so high a strength, common or other salt is added to it while in a state of dry-fusion; or in preference the foreign salts are not separated in the first place.

Second. In place of putting the hydrate of soda direct into casts it is run by preference on to iron plates, so as to form slabs about half an inch thick, which are ground and packed into casks.

[Printed, 4*d*. No Drawings.]

A.D. 1860, December 1.—N° 2949.

LOSH, William Septimus.—"A new method of preparing " sulphurous acid in solution." This consists in adding to water hyposulphite salts say of soda or lime or "other earthy or alkaline " hyposulphite," and then adding "sulphuric acid or any other " acid that will decompose the hyposulphite salts;" "sulphurous " acid is given off and the water becomes saturated. The sulphur " that falls and any other impurity is allowed to settle, and the " clear solution of sulphurous acid is ready, after decantation, " for use."

[Printed, 4*d*. No Drawings.]

A.D. 1860, December 5.—N° 2988.

DUMÉRY, Constant Jouffroy.—"A new or improved apparatus for extracting from water or any liquid the bodies in " dissolution or in suspension contained therein." This apparatus it is stated is "suitable for application for all forms of boilers," and "may also serve as boilers of a novel construction;" the object being to raise "liquid to a temperature sufficient to crystallize or solidify the matters contained in it. It is generally " applicable to crystalling salts, &c., and as applied to marine " boilers it effects the double purpose of separating the salt from " the water, thereby giving it the quality of fresh water, and also " extracting a product having a great relative value." The claims of the inventor are as follows:—First, "the taking in of the matters " near the upper level of the water line.

Second. "The return to the boiler in the vicinity of the fire " place."

Third. "The circulation channel in the vertical plane for the " carrying of the matters out of the boiler."

Fourth. "The circulation channel in the horizontal plane for " *the holding* of the matters out of the boiler."

Fifth. "The internal funnel."

Sixth. "The cylindrical, longitudinal, or other recipient, either " simple or multiple."

Seventh. "The circular or other recipient, with circular channel " beneath the lid."

Eighth. The agitator for stirring up the substances contained in the vessels.

The following is the method of operating:—In the boiler to which the apparatus is to be applied are "two openings, one at " the upper part a little below the water line, the other towards " the lower part of the boiler;" each of these openings are furnished "with a horizontal tube connected to each other by a vertical " tube. These three tubes on the one part, and the interior of " the boiler on the other, form a complete circuit in which the " water circulates without interruption." The liquid in the boiler is heated; "while the vertical exterior tube remains un- " heated" there will "be between the two columns a difference " of density," because of difference of temperature, producing a circulation in the circuit. The vertical tube communicates at bottom "with a recipient into which the water and the matters" it holds in suspension are "made to pass before re-entering the " boiler." "The heavy matters which fall vertically in the ex- " terior tube will continue their passage in the vertical direction " by the force of gravitation acquired, and will be precipitated to " the bottom of the vessel, while the water by reason of its density " will continue its circular motion as before." "The inlet and " outlet of the circuit are furnished with stop-cocks so as to cut " off the flow of water for the purpose of cleaning the recipient " when required." "The form, dimensions, and proportions " of this apparatus are dependent on the results desired to be " obtained."

[Printed, 2*s*. 2*d*. Drawings.]

A.D. 1860, December 11.—N° 3033.

TOWNSEND, JOSEPH.—(*Provisional protection only.*)—"Im- " provements in obtaining animal charcoal and other products " from bones and other animal matters." These are, submitting " bones, flesh, blood, hair, wool, woollen, and 'hard' rags, hoofs " and horns, silk, feathers, skins, leather, old shoes, and gelatinous " and albuminous substances," first, "to a lower temperature

" than is usually employed for the conversion of bones into " animal charcoal," and " in retorts such as are generally employed " in the manufacture of animal charcoal." The heat preferred is from 400° to 600° F., and " distilling at or near these temperatures " until nearly the whole of the condensable products are obtained. " The heat is then raised to 800° or higher, and is maintained " until all the volatile products are driven off. The retorts are " allowed to cool to 400° or less before the residue of charcoal is " drawn out." By this method " a charcoal having superior " decolourizing properties " is obtained, " together with a larger " quantity of liquid products, including parrafine, parrafine oil, " benzole, naptha, ammonia, nitrogen compounds, and other generally similar products, whilst there is less material lost in the " form of incondensible gases."

[Printed, 4*d*. No Drawings.]

A.D. 1860, December 11.—N° 3038.

TOWNSEND, Joseph, and WALKER, James.—" Improvements in treating bye-products arising in the manufacture of " soda and potash for the obtainment of antichlores and other " useful products." These are, first, the producing of hyposulphite and sulphite of lime, hyposulphite and sulphite of soda, potash, ammonia, or magnesia, or mixtures of such hyposulphites and sulphites; also, the obtaining of sulphur and oxides of manganese from solutions of sulphide of calcium, together with sulphates of soda, potash, ammonia, or magnesia, or mixtures of such sulphates and solutions of chloride of manganese, as follows.

Second, the using such hyposulphite and sulphite of lime, also " precipitated antichlore," obtained as follows, " in the manufac- " ture of paper," &c., &c.

In preference, " the bye or waste product obtained " in the manufacture of soda, known as " soda waste," is used; this is principally sulphide of calcium, and is moistened with a solution of sulphide of calcium and exposed to the air by turning it over until it is completely oxidated, observed by its solution ceasing " to give a black precipitate on the addition of a salt of copper or " of lead." " If the process of oxidation is arrested before its " *completion*," and the product lixiviated with water, the solution *is yellow* from sulphide of calcium, becoming black with the addition of a salt of copper or lead. To convert this sulphide of calcium into hyposulphite and sulphite of lime by causing the solution to absorb oxygen, by percolating it repeatedly through a tower containing coke or other suitable material. In either case if the solution contain a little sulphide of calcium it is preferred to "remove the last portion of soluble sulphide of calcium by adding "to it a small quantity of sulphuric, muriatic, or nitric acid, or a "solution of a soluble salt of iron, manganese, zinc, copper, or "alumina." The solution fully oxidised is acid; it is neutralised "by the addition of a small quantity of cream of lime or other "suitable alkaline substance, and then evaporated until it obtains "a specific gravity of about 1·25, when any insoluble matter is "allowed to subside, and a clarified solution containing hyposul-"phite and sulphite of lime is thus obtained." To this solution a solution of sulphate of soda of a specific gravity of about 1·18 is added until there is no further precipitate; hyposulphite and sulphite of soda are in solution, and the precipitate is hydrated sulphate of lime containing the foregoing salts, which is washed with water until not more than from 2 to 5 per cent. of these salts is mixed with the precipitate. This precipitate, dried at 212° F., constitutes the product designated as "precipitated antichlore." The solution, evaporated to a specific gravity of about 1·40, affords crystals which may be further purified by recrystallisation; or lumps are obtained by evaporating the solution to sp. gr. of about 1·65. Sulphates of magnesia, potash, ammonia, are substituted for sulphate of soda. "Precipitated antichlore" is obtained "by "substituting for fully oxidised liquor partially oxidised liquor." The supernatant liquor is treated as above for the corresponding hyposulphite and sulphite salts. Hyposulphite and sulphite of lime are obtained from the above liquor by evaporating it to dryness. The insoluble residue left after lixiviation of the oxidised soda waste is digested with a solution of caustic or carbonate of soda or potash, and the solution evaporated for sulphite of soda or potash in lumps or crystals.

"To obtain sulphur and certain useful sulphides," the "un-"oxidised liquor" "is mixed with chloride of manganese, or with "the still liquor resulting as a bye-product in the manufacture of "chlorine, and these liquors may be treated in three ways." First, by adding a small quantity of the chloride of manganese sulphur is principally precipitated, which may be used as such

" in the manufacture of sulphuric acid, or for other purposes." " The supernatant liquor consists chiefly of a solution of the " chlorides of manganese and iron," which is " operated upon for " recovering or producing oxides of manganese." " Sulphur " may be obtained by applying this process to the oxidised " liquor." Second, " the solutions may be so proportioned that " the resulting precipitate will consist chiefly of free sulphur and " sulphide of iron," which when dried " may be used in the " manufacture of sulphuric acid, or for other purposes." The supernatant liquid " consists chiefly of chloride of manganese " " in a very suitable state for obtaining oxides of manganese free " from iron." Third, " the solutions may be so proportioned " that the precipitate will consist of free sulphur, sulphide of iron, " and sulphide of manganese." The precipitate collected, drained, dried, and " cut into cubes of two or three inches, are dried at a " temperature not exceeding 250 F.," " is ready to be used in the " manufacture of sulphuric acid;" the residue after burning " contains a considerable proportion of oxide of manganese, which " may be used in the manufacture of chlorine."

[Printed, 6*d*. No Drawings.]

A.D. 1860, December 11.—N° 3039.

VERWEY, Anton.—" Improvements in the proportions of " ingredients and mode of manufacture of a chemical compound " for softening water." These are, " the production of a solid " compound, and its reduction to a state of powder, by the use of " carbonate of soda combined with liquid silicate of soda, and " which compound is particularly suitable to be employed for " softening hard waters." " The proportions of ingredients " preferred " are two parts anhydrous carbonate of soda (such as " occurs in commerce as 'soda ash,' or 'alkali'), one part of " commercial bicarbonate of soda, and two parts of liquid silicate " of soda having a specific gravity of 1·550. " The whole of the " ingredients are mixed together and allowed to remain quiescent " for about twenty-four hours, when it stiffens and usually " becomes sufficiently hard to allow of its being pulverized;" but if needful, it is dried in a stove and pulverized.

[Printed, 4d. No Drawings.]

A.D. 1860, December 24.—Nº 3154.

SPENCE, Peter.—(*Provisional protection only.*) — "Improvements in separating copper from its ores." These are adapted, it is stated "particularly to the separation of copper from ores "which have been treated for the extraction of sulphur," but are also "applicable to ores in the original condition." The material in a finely divided state is submitted to heat in a furnace or other suitable apparatus, when the whole or the greater of the copper is found to have been converted into a salt soluble in water, and which may be dissolved in any convenient manner. "Or if "the whole be not rendered soluble," the calcined ore is subsequently treated with suitable acids.

[Printed, 4*d*. No Drawings.]

A.D. 1860, December 28.—Nº 3179.

BINKS, Christopher.—(*Provisional protection only.*)—"Improvements in manufacturing certain gases applicable in generating heat and light, and in bleaching." These are, the economical manufacture of chlorine and oxygen; and as regards chlorine, the decomposition of hydrochloric acid through the agency of oxygen gas mixed with or brought in contact with the hydrochloric acid under the conjoined action of a high temperature and the presence of substances capable of retaining or fixing the water formed by the reactions between the oxygen and the hydrogen of the hydrochloric acid, but not capable of retaining or fixing the chlorine liberated in its gaseous form. Oxygen is produced, first, by the decomposition of water "free or combined, or in its ordinary "form or in that of steam, or of steam superheated or otherwise, through the agency of chlorine mixed with or brought in "contact with the water or the steam under (preferably) the "conjoint action of a high temperature, and the presence of any "substance or substances capable of retaining or of fixing, by "combination or otherwise, the hydrochloric acid formed by the "reactions between the hydrogen of the water and the chlorine, "but not capable of retaining or of fixing the oxygen, which is "thus set free in its gaseous form;" secondly, by exposing oxides of manganese, preferably the sesqui and the peroxides, to the action of chlorine, and preferably aiding the reactions between these by means of heat applied either to the oxide or to the chlorine or to both, thereby forming chloride of manganese, and setting free in its gaseous form the combined oxygen of the oxides. The residual chloride of manganese can then be treated for reoxidation of its metal, according to No. 1240, 1860.

[Printed, 4d. No Drawings.]

1861.

A.D. 1861, January 4.—N° 20.

COBLEY, THOMAS.—"Improvements in the mode of obtaining " or manufacturing commercial salts of lead directly from the " ores of lead." These are, first, "the use and application of " carbonate of lead ore, or native carbonates of lead, as a source or " material for manufacturing commercial salts of lead."

Second. "The mode of producing acetates of lead by subjecting " the said carbonates of lead to the action of vapours of pyro" ligneous acid or nitrous acids, substantially" as follows:—The ores, after reducing them to powder by grinding, are subjected to the "vapours of acetic or pyroligneous acid, either derived from " distillation or from vapourization of the acids themselves, or " the decomposition of acetates or pyrolignites, or by fermenta" tion." "The ores are saturated with water to condense the " vapours." A series of vats are filled with the prepared ore, and the liquor is worked "through until sufficiently concentrated for " crystallization or decomposition, allowing it to pass through " animal charcoal," &c. Nitrate of lead is prepared by passing into the prepared ore saturated with water vapours of nitrous acid; "the nitrate solution is filtered off and crystallized." O the acetate of lead solution obtained as above, may be treated with a solution of nitrate of soda or an alkaline nitrate to form nitrate of lead and acetate of the alkali. In the Provisional Specification nothing is said of the first of these modes for producing the nitrate of lead. Chromate of lead is prepared by adding a solution of a chromate to a solution of either acetate or nitrate of lead, " so as to precipitate all the lead in solution."

[Printed, 4d. No Drawings]

A.D. 1861, January 7.—N° 42.

MEASE, George Dryden.—(*Provisional protection only.*)—"Improvements in the manufacture of sulphuric acid, and also "in separating copper and silver from their ores." These are, "in the manufacture of sulphuric acid in place of employing "pyrites as is commonly done," employing poor sulphuret ores of copper containing a large per-centage of sulphur, and bringing the copper and the iron in such ore "into forms in which "they are readily separated the one from the other," the copper "being sulphate soluble in water, the iron peroxide, which is "insoluble. For this purpose the copper ore is burnt in a pyrites kiln whilst steam is brought into contact with it. "The sulphu-"rous acid gas is mixed with nitrous gases and passed into the "leaden chamber." In burning copper ore as above "it is not "possible to convert the whole of the copper into sulphate," therefore the calcined ore is powdered and mixed with protosulphate of iron, or "a portion of crude ore of sulphur may be "employed," and the mixture exposed "to the combined action "of heat and moisture." In preference mixing a solution of the protosulphate with the ore, and heating and moistening it alternately, or the ore is heated to a low red, and "then let down "upon it, or apply in small streams first the solution of sulphate "of iron, and then the water," "so regulated that the ore may be "maintained at a uniform heat throughout the process." When the conversion is complete the charge is drawn, the sulphate of copper dissolved out from the peroxide of iron; the copper is precipitated from its solution of sulphate by iron, and freed from any iron by hydrochloric acid or otherwise. The solution is evaporated for crystals of protosulphate of iron, and the mother liquor is employed for mixing with the burnt ore as above. "In "some cases before or after exposing the burnt ore to the combined "action of heat and moisture," the powdered ore in trays is exposed to the gases before they enter the sulphuric acid chamber. The above process is applicable to "ores containing copper "and iron which have not been burnt." When oxide or carbonate ores are treated alone, "sulphate or chloride of iron may "be employed as above." Hydrochloric acid, sulphuric acid, and sulphur may also be similarly employed in conjunction with heat and moisture." "The waste material known as manganese "liquor" is "very suitable for use for this purpose;" it is also used to separate any iron from precipitated copper, "having first, " however, neutralized the chlorine (contained in it) with sulphate " of iron or otherwise." "If the copper ores treated contain " silver, the same will, if a sulphur process is employed, become " converted into sulphate, which is soluble in water," from which is thrown down by metallic copper, "before the copper is thrown down by iron." "If a chlorine process is employed the silver is converted into chloride" insoluble in water, but if preferred, salt water may be used, which dissolves out both the chloride of silver and of copper. In roasting copper ores with common salt the process "is rendered much more rapid and " complete by the application of moisture during the roasting " process."

"Silver ores not containing copper, or from which it is not " desired to separate copper," may be treated as the copper ores by heat and moisture, "suitable salts being added to the ore when " required." "Besides the salts already named as suitable for " use for this purpose when treating copper ore, chloride of " copper or of zinc may be employed when a silver ore is under " treatment."

[Printed, 4*d*. No Drawings.]

A.D. 1861, January 8.—N° 49.

HALLETT, George, and **STENHOUSE**, John.—" Improve- " ments in the manufacture of pigments for coating surfaces." These are, taking the native oxide of antimony (usually associated with the grey sulphide of antimony), and having freed it from its gangue as much as is requisite by picking and washing, it is reduced to a fine powder by grinding and sifting. The powdered oxide is then introduced into large crucibles, muffles, ovens, or suitable furnaces, where it is cautiously roasted at a slow red heat with access of air, "occasionally stirring to prevent the tempera- " ture rising above a low red heat. During the roasting are " evolved" the vapours of water, sulphur, and sulphurous acid, together with antimonial and arsenical fumes, "and the ore " becomes lighter in color and less fusible. When no more fumes come off the roasting is completed. "It is then found that " almost all the antimony in the roasted ores is in the state of " anhydrous antimonious acid." "The impure antimonious acid " produced in this way is then reduced to an almost impalpable

" powder by grinding and levigating with water. When dried " it constitutes a pigment, and when ground up with suitable " quantities of oil or varnish, or other materials, it forms a paint. " When it is thought desirable other oxides, salts, or materials, " such as oxide of zinc, carbonate of lead, or chromate of lead, " may be combined with the calcined product, consisting chiefly " of antimonious acid thus prepared so as to form pigments " suitable for coating of surfaces," or with " native oxide of anti- " mony or native oxide of antimony containing sulphide or " antimonious acid."

[Printed, 4*d*. No Drawings.]

A.D. 1861, January 18.—N° 139.

TOWNSEND, Joseph, and **WALKER**, James.—" Improve- " ments in mordanting and in the manufacture of products to be " used as mordants and otherwise." These are, " using hypo- " sulphite and sulphite of alumina as a mordant in Turkey red " dyeing, instead of the mordants hitherto employed," and also " certain improved processes whereby hyposulphite and sulphite of " alumina and other products are obtained." These last products are prepared by adding about " 54 ounces of commercial " sulphate of alumina, or 75 ounces of alum to every gallon of " oxidised liquor," " obtained from soda and potash wastes " by processes described in No. 3,038 (December 11, 1860), " of a " specific gravity of 1·25 or 50 degrees Twaddle. The mixture " is allowed to settle, when hydrated sulphate of lime is precipi- " tated." The supernatant liquid is " hyposulphite and sulphite " of alumina," and is the mordant. The hydrated sulphate of lime is collected, washed, and dried, and named " precipitated " antichlore," and is used in paper-making. The mordant is also prepared " by substituting for the 'oxidised liquor' any of the " supernatant liquors containing hyposulphite and sulphite of " soda, potash, ammonia, or magnesia separated from the 'pre- " 'cipitated antichlore,' produced by processes described " in No. 3038. " In mixing a solution of alum or sulphate of alumina " with any of the hyposulphites of soda, potash, ammonia, or " magnesia no precipitate will be produced." The mordant is likewise prepared " by substituting for alum or sulphate of " alumina chlorides of aluminium or nitrate of alumina " in the proportion of their chemical equivalents.

The remainder of the processes are for the application of the mordant obtained above to dyeing purposes.

[Printed, 4*d*. No Drawings.]

A.D. 1861, January 26.—N° 209.

DREVET, Charles Achille.—(*Provisional protection only.*)—" Improvements in the manufacture of sulphurous acid, sulphites " and bisulphites, and sulphuric acid, and in the apparatus em" ployed therein; and in the application of one of the products " of such manufacture to the bleaching of textile, animal, and " vegetable substances." These are, in reference to this subject, first, to produce sulphurous acid sulphur is burnt in a retort, supplied by air entering "through a pipe through a perforated " plate by means of a bellows. The sulphurous acid thus pro" duced passes through a receptacle divided into compartments," in which sulphur deposits, the gases are cooled by passing through a worm, and then pass into " water or a solution of a base or of a " carbonate." The superfluous, &c. gases escape by an opening into the atmosphere. "A gas epurating apparatus is also em" ployed when a bisalt is formed." This consists "of a box into " which the end of a leaden pipe is immersed, through which " passes the disengaged gas from the principal apparatus. These " gases are passed through an alkaline solution and become freed " from any sulphurous acid gas."

Second. Sulphuric acid is produced by injecting the sulphurous acid produced as above "into the leaden chambers, where the " manufacture is continued by known means, or by injecting it " mixed with air or water, steam or oxygen, into a heated tube " containing platinum sponge." In the first place is obtained " anhydrous sulphuric acid; in the second, hydrated sulphuric " acid."

[Printed, 4*d*. No Drawings.]

A.D. 1861, January 26.—N° 215.

HALLETT, George, and STENHOUSE, John.—" Improve" ments in the manufacture of pigments for coating surfaces." These are, employing "native oxide of antimony or such native " oxide of antimony as may contain a small proportion of sul" phuret of antimony, which is reduced to a fine powder; the " impurities it contains derived from its matrix or gangue are

" separated by picking and washing as far as practicable." The finely powdered native ore after drying is " calcined at a red heat " in open vessels, or suitable furnaces with free access of air, till " any sulphur present has been expelled, and the oxide has been " converted into or chiefly into antimonious acid," which is ground up, &c. as a paint. The above process, abridged from the Provisional Specification, is not in the Final Specification. The ore known as the grey sulphuret, prepared by picking, &c. as above, is mixed with oxide of zinc and heated to strong redness for about an hour, when it is cooled, ground to a fine powder, and calcined at a moderate red heat with free access of air, and continued stirring until no more sulphurous gas is evolved; the mixture is reduced to a fine powder. The oxide of zinc employed is " obtained from " any of the known sources of that compound." The decomposition of sulphuret of antimony is also effected by heating it with metallic zinc. " If the pigments formed by the combinations " of the oxidised compounds of zinc and antimony produced by " any of the processes above described are mixed with oxide of " lead and calcined as above, yellow pigments result. Purified " sulphuret of antimony, as also glass of antimony, are treated in " the same way with like results. Metallic antimony and the " ore " known in commerce as native metallic antimony are treated in a similar manner, " the antimony absorbs oxygen, and combining with the oxide of zinc forms pigments," and this result with oxide of lead as above yields yellow pigments. Native oxide of antimony mixed with a considerable quantity of sulphuret of antimony is treated as above; the results are similar. " If native " oxide of antimony or the anhydrous antimonious acid obtained " by calcining native oxide of antimony is mixed with its own " weight or other suitable quantity of oxide of lead, with or " without the addition of oxide of zinc, and calcined, a yellow " pigment is produced." " Type metal or worn out types are " reduced to a coarse powder, are intimately mixed with oxide of " zinc and calcined " ; yellow pigments are produced.

[Printed, 4*d*. No Drawings.]

A.D. 1861, January 30.—N° 240. (* *)

COURTOIS, Alexander, and DE SOULANGE, Jerome Ernest.—(*Provisional protection only.*)—Improvements in kilns for burning limestone, gypsum, &c.

" This kiln is built by preference of a truncated pyramidal shape, " provided along its vertical axis with an inner shaft or vertical " flue, of a cylindrical or inverted truncated form, which shaft or " flue is to receive the materials to be calcined, and is lined with " fire-bricks. Towards the lower end of this flue or shaft the " interior is partly surrounded by an arched gallery with colon- " nade of fire-brick or other suitable fire-resisting material, these " columns being set sufficiently far apart for allowing the flames " from the fuel to escape between them, and thus be equally dis- " seminated and act with regularity on the materials in the shaft. " Towards one or both ends of the gallery is situated a fire-grate, ' on which is thrown the fuel for heating the kiln."

[Printed, 4*d*. No Drawings.]

A.D. 1861, February 9.—N° 330.

JULLION, John Louis.—" Improvements in the treatment of " soda waste and sulphurets." There are, first, soda waste or gas lime, the former preferred, is ground, and having ascertained the amount of sulphur contained in it, an equivalent of powdered carbonate of magnesia is added, and the whole boiled together with a considerable quantity of water for half an hour. Carbonate of lime and sulphuret of magnesium are formed, to separate which the sulphuret of magnesium is made soluble " by the addition of " a second atom of sulphur, either in a free state or as a poly- " sulphuret of an earthy base, after which the lime is separated by " filtration." The sulphuret of magnesium solution is formed into hyposulphite of magnesia by saturating with sulphurous acid, from which is precipitated the carbonate or hydrate, or it is boiled down to dryness and burnt in ordinary sulphur kilns, the excess of sulphur forming sulphurous acid, and the residue is " available " to make Epsom salts or other magnesium compounds."

Second. The waste is oxidized into a state known as " yellow " liquor" by exposing it to the air and moisture; both oxygen and moisture are absorbed and the yellow fluid runs off, which is " a " complex sulphuretted hyposulphite of lime." On saturating this solution with sulphurous acid sulphur is precipitated, and is separated, washed, and dried. The solution, which is hyposulphite of lime, is boiled with powdered carbonate of magnesia, the hyposulphite of magnesia in solution is separated from carbonate of lime and treated as above. When precipitated chalk is required the hyposulphite of lime is precipitated by carbonate of soda; or the hyposulphite is decomposed by an equivalent of hydrochloric acid and "collect the sulphur (precipitated) and sul-" phurous acid given off," and the lime is precipitated as sulphate. When the sulphur alone is to be recovered the yellow liquor is concentrated, and an excess of dust of pyrites stirred in, and the whole dried is ready for burning as with ordinary pyrites.

[Printed, 4*d*. No Drawings.]

A.D. 1861, February 9.—Nº 335.

LEIDEMANN, Augustus, and **LANGE**, Theodore.—(*A communication from Ludwig Brumlen.*)—"The manufacture of " sub or oxi-sulphate of lead." This consists, first, "the com-" position of a white precipitate" which is called "oxi or sub-" sulphate of lead, and which consists of sulphate of lead and " oxide of lead in different proportions."

Second. "The method of manufacturing the same," as follows:—"The sulphate of lead obtained as a refuse in the cotton " printworks or other works" is "mixed with about an equal " quantity of chloride of lead," and submitted to the action of lime water till there is no more "precipitate of lead, or till blue " litmus paper no longer changes its colour." When sulphate of lead cannot be had, "acetate of lead is made," by dissolving " litharge or lead in a diluted acetic acid, and precipitate therefrom " one half its contents of oxide of lead by the introduction of " sulphuric acid, and the other half by muriatic acid." The acetic acid with some chloride of lead is drawn off, and the white precipitate of chloride and sulphate of lead "is treated with lime water " or a weak solution of caustic alkali till all the chloride of lead is " decomposed," and the chloride of calcium washed from the precipitate. The acetic acid is used "over and over again for the " production of new quantities of acetate of lead."

[Printed, 4*d*. No Drawings.]

A.D. 1861, February 13.—Nº 361.

JONES, Eden Thomas.—(*Provisional protection only.*)—"The " suppression of arsenical and sulphurous fumes emitted during " the first operation or calcination of copper ores." This consists in the use of a clay or iron retort fixed like a gas retort; the ore is spread equally over the bottom, "a condenser about " twenty feet in length and six to eight inches in diameter, a

" tached to the neck of the retort by a socket joint," is immersed in a tank of cold water through which is a continuous flow; "the " opposite end of the condenser must terminate in a box twelve " inches square, the bottom of which must be open and dip into " water about four inches, contained in a box or cistern about " four feet square and four feet deep." "As the arsenical and " sulphurous fumes, during the calcination, become condensed " they must be scraped from the condenser with a long rod hav- " ing a semicircular head into the small box over the water at the " end." From one to three retorts may be erected in one oven. The time of calcining the ore is from twelve to eighteen hours, and " a door or stopper must be screwed on the mouth of each retort, " with a suitable opening underneath, through which the calcined " ore is to be raked into a subjacent vault, or into an iron tank or " wheelbarrow."

[Printed, 4*d*. No Drawings.]

A.D. 1861, Februury 14.—N° 376.

COBLEY, THOMAS.—(*Provisional protection only.*)—"Improve- " ments in the manufacture of white lead, zinc white, and glazing " or potters' lead." These are, giving to these matters "in- " creased density, greater permanency of colour and drying " properties (and to potters' or glazing lead), greater flexibility," by introducing a solution of borax, preferring the refined borax of commerce, the strength of which "will depend upon the nature of " the pigment to be treated" "at the last stage of washing, when " it has settled down to a sufficient consistency, and pure enough " for finishing, when it may be ground into it and carefully " dried."

[Printed, 4*d*. No Drawings.]

A.D. 1861, February 19.—N° 408.

CLARK, WILLIAM.—(*A communication from Louis Joseph Frederic Margueritte, and Alfred Lalouël de Sourdeval.*)—" Im- " provements in the preparation of alkaline earthy cyanides." These are, first, preparing "cyanides and ferrocyanides of potas- " sium, sodium, and barium, by passing a current of ammoniacal " gas over carbonates of these bases mixed with charcoal, lamp- " black, or pitch." "The mixture is then subdivided by mix- " ture with sawdust to render it porous and pervious," and "placed in a retort or tube and heated to a dark red color;" also "the employment of raw soda (a mixture of caustic soda and "carbonate of soda) for producing the said chemical action." "If on leaving the retort any ammonia or cyanhydrate be disengaged, the supply of gas is stopped, and the mass is discharged into a chamber to stifle it;" when cooled it is steeped in boiling water and filtered. The solution, when treated "with "a mixture of proto and persalts of iron, will furnish an abundance of precipitate of Prussian blue." By boiling this solution "with iron filings, ferrocyanides of a corresponding "nature will be produced."

Second. Preparing of "cyanides or ferrocyanides by the reaction of cyanide of barium on a soluble sulphate, which produces a precipitate of sulphate of barytes."

Third. "The regeneration of carbonate of baryta by calcining "the sulphate rsidue above mentioned with charcoal, and thereby transforming it into sulphate (sulphuret?) of barium; also "passing a current of carbonic acid into the sulphate (sulphuret?) in solution, which will precipitate the greater part of the "baryta into a state of carbonate of baryta, while the remainder "will form a persulphuret."

[Printed, 4*d*. No Drawings.]

A.D. 1861, February 28.—N° 514.

LAING, Robert.—"Improvements in the treatment of certain "ores containing metals, and in obtaining products therefrom." These are said to be, "the use and application of gases usually "going to waste in the manufacture of sulphuric acid for the "purpose of extracting copper and other metals from the burned "ores commonly called pyrites, after such ores have been used in "the manufacture of sulphuric acid." First, by "placing the "ore coming from the burners or kilns in any convenient vessel, "and applying steam for a given period, so as to affect the entire "mass of ore," and when this is accomplished covering the ore with water, applying steam, and digesting at the boiling point for two or more hours. The time required in each stage of the process will be regulated according to the quantity operated upon at one time. This process may be repeated until the copper and other metals are abstracted. "The separation of the metals in "the solution can be afterwards effected in the usual manner."

Second. Placing the ores in a vessel, covering them with water, applying a fire, and digesting for a few hours, and repeating the same till the results are obtained. "This process may not be " found so effective."

Third. The ores are placed upon a water-tight foundation, and tanks or receivers are provided for any liquid flowing from the same. The ores are placed about ten feet deep, and a series of pipes perforated at the lower end are placed at intervals over the surface of the ore. The pipes "may be covered to the extent of " two or three feet by a further quantity of ore." The aforesaid waste gases with steam and air are admitted so as to oxidise the gases while passing through the pipes, while showers of water are admitted from time to time, "whereby the solution of the metals " is promoted, and their separation facilitated." In this process using "the burned ore either before or after the previously de" scribed process of washing," producing sulphate of iron, &c.

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 15.—N° 642.

PHILLIPS, John Arthur.—"Certain improvements in the " manufacture of white lead and other salts of lead direct from " ores containing carbonate of lead." These are, roasting " carbonate of lead ores in close retorts, so as at the same time to " prevent the peroxidation of the metal, and also obtain a supply " of carbonic acid gas, and the direct treatment of the roasted " ores thus prepared by neutral acetate of lead," and treating the subacetate of lead with "carbonic acid gas, by which means a " perfectly pure carbonate of lead is obtained from ores contain" ing lime and iron, which metals are invariably present in and " injure the color of all white leads prepared from these ores by " the use of free acetic acid or an acid salt of lead." The temperature at which the ores are to be heated must not exceed 700° F. "For the purpose of facilitating the elimination and " utilization of the carbonic acid present in the ore," an exhausting apparatus is employed, "by means of which the gas evolved " is forced through subacetate of lead liquors for the purpose of " forming white lead."

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 15.—N° 650.

LORBERG, William.—"An improved process for obtaining " *and utilizing* the chemical products of spent bark (commonly

" called 'tan') and all other woody fibre, also improved appa- " ratus to be employed therefor." This consists in subjecting " tan, sawdust, dyewoods, and the like," to destructive distillation, and collecting and treating the products. The tan is mixed either with wood tar or coal tar, " from 1 ounce to 6 ounces (by " weight) of tar to every pound weight of tan." This is distilled preferably in an upright moveable retort. There are three condensers and a gasometer, the first for the acid, the second for the ammonia, the third for the tar and water. The first condenser is provided with "2, 3, or 4 perforated false bottoms," on which an alkali or alkaline earth is placed, as lime; or the false bottoms may be dispensed with, and milk of lime used; in this case there is an agitator. In the second condenser is an acid, " either sul- " phuric, hydrochloric, nitric, or oxalic, according to what salt of " ammonia is to be obtained;" proper means of condensing are used, and the tar, naptha, &c. pass into the third condenser, and are there condensed, "the gas again passing off through a pipe " at the top either into the furnace or into a gas holder." The liquor drawn by a tap at the bottom of the first condenser, if lime or chalk had been used, "consists of a solution of acetate of lime, " mixed tarry matters," &c. After subsidence of the tarry matters, " if acetate of lime is to be made, the liquor is boiled " down to dryness," and the crystals as " they form are removed, " drained, and dried." "If acetate of soda be the object of " manufacture, then the liquid is drawn into a pan," boiled down to about 15° Baumé, and then decomposed by the requisite quantity of sulphate of soda or carbonate of soda, decanting the clear liquid, and repeatedly crystallizing the acetate. But it is preferred "to torrify it as follows:"—The brown crystals of acetate of soda are fused at about 550° F., and when so fused dry acetate is added in small portions at a time, so as " never to inter- " rupt the fusion of the melted mass," continuing "the process " until the pan is nearly full," keeping " up the fire for an hour " or more, constantly agitating the mass," when it is run into a shallow iron pan, dissolved in water, and crystallized out from carbonate of soda in the mother liquor, then " throw back the mother " liquor into a fresh quantity of acetate of lime to be decomposed." The liquor "from the ammonia receiver," consisting of sulphate or chloride "according to what acid was used," is separated from tarry matter and purified in a manner similar to that of the ace- " tate," and "if the chloeide be required pure it has ultimately to "be sublimed in the usual way." The remainder of this Specification has reference to the obtaining of oils, &c. and gas.

[Printed, 8*d*. Drawing.]

A.D. 1861, March 27.—N° 769.

WILLANS, Jacob Geoghegan. — "Improvements in the "preparation of hydrated oxide of iron, and the application of "such prepared oxide for the absorption or separation of sulphur "from certain gases." These are, first, "preparing hydrated "oxide of iron from such iron ores as are hydrated oxides, by "crushing or grinding the ores and separating the fine particles "from the coarse" "by means of water or other fluid, or by a "current of air or other gaseous matter, or by such apparatus as "is commonly used for sifting wheaten flour," and employing the oxide so prepared in the purification of coal gas from sulphur, or for absorbing or collecting sulphur from sulphuretted hydrogen gas given off from substances containing sulphur whilst undergoing decomposition or chemical action.

Second. In the preparation of oxide, which will be hydrated from ores of iron containing oxygen which are not hydrated oxides, or from ores of iron containing hydrated oxide; also from materials rich in iron, such as burnt pyrites or cinder produced at iron works or smelting works, or hammer slag, or similar scaly particles formed during the process of hammering or rolling iron or steel. This is effected by acting upon any of the above, at or above a red heat, with carbon or other deoxidizing agent, and afterwards exposing the same to the influence of air and moisture, or other oxidizing and hydrating influences.

Third. In employing the hydrated oxides so obtained for the same purposes to which the natural hydrated oxide is applied as above stated.

[Printed, 4*d*. No Drawings]

A.D. 1861, April 6.—N° 848.

DOWN, Jonathan.—(*Provisional protection only.*)—"Improve-"ments in treating certain ores and alloys, and in obtaining "products therefrom." These are, first, treating cobalt, nickel, manganese, copper, and other ores by crushing them to powder, and covering them with any suitable strong acid, heated or not, allowing the acid "to become perfectly saturated" with the metals, drawing it off, and if necessary treating the ore "with fresh "acid until the whole of the metals are extracted." If copper is in the solution, it is separated by scrap iron, and the cobalt and nickel precipitated from the solution by metallic zinc. The solution still contains manganese, which is "precipitated in the ordinary "way." These metals "may be re-dissolved by any suitable "acid and purified in the ordinary way."

Second. Treating ores of "cobalt, nickel, manganese, and other "metals" occurring "as arseniets, sulphurets, mixed or singly, "and combined with iron, manganese, and being a mixture of "oxides, arseniets, sulphurets and sulphates," by crushing, calcining, and dissolving in an acid.

[Printed, 4*d*. No Drawings.]

A.D. 1861, April 11.—N° 894.

KERNOT, Charles Noyes, and RUCKER, Martin Diedrich.—(*Provisional protection only.*)—"Improvements in the "method of obtaining ammoniacal salts, and other valuable "products, from liquors or substances containing ammonia, and "for utilising the residuum." These are, obtaining these substances, without the application of heat, by adding to such liquors "crude sulphate of zinc or other sulphates, or a liquid specially "produced from animal or mineral substances acted on by a "weak solution of acids, the residuum producing gelatinous "substances, or the liquor or solution is to be passed through "filters containing the sulphates or a preparation from animal "mineral substances."

[Printed, 4*d*. No Drawings.]

A.D. 1861, April 16.—N° 929.

EDEN, Frederick Morton.—(*Provisional protection only.*)—"An improved method of manufacturing silicate of lime or "hydraulic cement." This cement is manufactured by first "intimately mixing carbonate of lime or rich lime in suitable "proportions with silicate of alumina (fire-clay), the ingredients "being in a dry powdered state. This mixture is then burnt upon "hot plates or tiles, or in ovens, kilns, or crucibles, or otherwise, "until the alumina is set free and the silica has combined with "the lime. The product (silicate of lime) is then ground to an "impalpable powder, and is ready for use."

[Printed, 4*d*. No Drawings.]

A.D. 1861, April 16.—N° 932.

MALCOLM, James Drysdale.—(*Provisional protection only.*) —"Improvements in the manufacture of nitric acid and caustic "soda, which are also applicable to the obtaining of other chemical "products." These are, adding to "nitrate of soda a substance "with which the soda will not combine" or not easily combine at the temperature required to distil off nitric acid. It is stated that "there are many such materials which might be used;" as an illustration sand is given. Mixing "together intimately one "part, by weight, of nitrate of soda with three parts fine clean "sand," introducing them "into a retort heated to redness," collecting the nitrous fumes "by water in the Woulfe's bottles in "the usual way." The residue in the retort is "caustic soda, "with perhaps a small portion of silicate of soda," and the sand. "If the proper heat" be not observed the acid may become decomposed into its constituents, oxygen and nitrogen. The proportions of nitrate of soda and sand may vary.

[Printed, 4*d*. No Drawings.]

A.D. 1861, April 19.—N° 962.

MINGAUD, Philippe.—"Improvements in obtaining jellies, "syrups, and drinks from the tree arbutus unedo or arbousier." These are, in reference to this subject, as follows:—"Vinegar is "obtained by leaving the fruit in a receptacle until acid fermentation has taken place, then pressing out the juice and filtering; "the vinegar thus obtained is agreeably sharp and of a fine "rose color." The other processes are for obtaining jellies, syrups, and drinks.

[Printed, 4*d*. No Drawings.]

A.D. 1861, April 20.—N° 983.

WEBSTER, James.—(*Provisional protection only.*)—"Improvements in manufacturing oxygen gas and obtaining certain "other products." These are, "treating a mixture of nitrate of "soda or other nitrate with an oxide of iron for the purpose of "obtaining oxygen gas, nitrogenous compounds, and the base of "the salt employed." The mixture is distilled in a retort. The *nitrogenous* compounds contained in the gaseous products of *the distillation* are separated by condensation from the residue of those products, consisting chiefly of oxygen gas, which is collected in a receiver. "The residuum in the retort is the base of the salt " employed, and if it be an alkali or alkaline earth it will be in a " caustic state."

[Printed 4*d*. No Drawings.]

A.D. 1861, April 23.—N° 1006.

WARD, PETER.—"Improvements in the manufacture of sul-" phuric acid." These are, arranging in the leaden chambers used in the above manufacture, "glass or other material, employed " either in the form of sheets, tubes, or otherwise, so as to expose " a great extent of surface in contact with the mixed sulphurous " and nitrous gases, and the surfaces are kept moistened, holding " a film of acid." The gases, in preference, are passed into a mixing chamber of lead, steam is introduced, and some acid is condensed; the uncondensed gases pass into a second leaden chamber, in which are arranged sheets of glass so as to divide it " into a series of narrow passages" "through which the gases are " compelled to pass." "Steam is introduced into the second " chamber at the end next to the first chamber, and in quantity " sufficient to produce acid of from 1·675 to 1·750 specific " gravity." The acid contains a considerable quantity of "nitrous " acid and nitric oxide; it is run back into the leaden trough " leading from the burners to the first chamber, where, by the " action of the sulphurous gas and steam, it is deprived of its " nitrous acid and nitric oxide." "In place of sheets of glass, " tubes of about an inch in diameter may conveniently be em-" ployed, the tubes being laid horizontally and longitudinally " within the chamber."

[Printed, 4*d*. No Drawings.]

A.D. 1861, May 1.—N° 1084.

LAING, ROBERT, and SWINDELLS, ISRAEL.—"Improve-" ments in the treatment of certain ores containing metals, and " in obtaining products therefrom." These are, "the application " of gases for the reduction of metals to a soluble condition, and " further, for the same purpose, the use and application of gases " which have hitherto gone to waste, or partly so, in the manu-" facture of sulphuric acid;" and using "the said gases in the " manufacture of sulphurous or sulphuric acid or salt cake," as follows:—Raw ores are crushed, roasted, or calcined, and the gases collected and treated as in making sulphuric acid, applying a portion of the gases for the reduction of the ores, as after described. The calcined ores are digested in steam "for two or "more hours, and add a supply of water, and by means of the "steam, boil the mass for an hour or two," and "draw off the "liquid, and repeat the washing process until the solution "becomes very weak." The ore is afterwards treated with gases. "This preliminary process of washing is not essential to the "application of the gases." The ores are placed, in preference, in towers of stone or bricks on a perforated bottom, the bottom part is lined with lead, forming a vessel to receive the liquid flowing from the ore. In the lower part of the tower is "a pipe or "pipes to conduct the gases, also a pipe to supply them." "Instead of the washing process separately described, nearly the "same effect may be produced by passing a large volume of steam "up the tower for several hours," and if necessary, "washing "down with a stream of water" before applying the gases. The liquid is collected, and the metals are separated "by any of the "well-known methods." The gases are applied "in like manner "to carbonates and other ores not being sulphurets."

[Printed, 4*d*. No Drawings.]

A.D. 1861, May 3.—N° 1115.

MANNING, James Alexander.—"A mode or method of "collecting ammonia from the waste gases arising from the com- "bustion of coal." This consists in vapourizing the effluent or escaping gases, as they leave the furnace and ascend the main chimney or shaft, by the introduction therein, or admixture therewith, of a jet or jets of steam. This steam after it has become charged with the ammoniacal and other gases with which it will combine, or by which it becomes impregnated, is condensed by passing it through or into suitable condensors or refrigerators, so that an ammoniacal liquid may be obtained, from which sulphate of ammonia may be manufactured by the ordinary or any suitable process, for preparing that salt from ammoniacal liquor." The waste gases to which this process is to be applied, are those "*arising* from the combustion of coal in the manufacture of coke, "*and from* the combustion of fuel in factories, foundries, and

" in other situations or processes wherein coal is largely con-" sumed."

[Printed, 10*d*. Drawing.]

A.D. 1861, May 11.—Nº 1200.

DE MELCY, Auguste César Achille Gérard.—(*Provisional protection only.*)—" An improved treatment of natural phosphate " of lime for several purposes." This consists as follows :— " Nodules, coprolites, apatites, all the mineral phosphates, and " even bones," are ground and mixed with sulphuric acid diluted, " to separate all the phosphoric acid ;" the liquid is decanted and the residue washed ; the solution consists of " acid phosphate of " lime, free sulphuric acid, free phosphoric acid, and a certain " quantity of plaster, as well as phosphate of iron dissolved by " free acids and sulphate of iron. The two last salts may be " employed in the preparation of Prussian blue, by adding to " them ferrocyanide of potassium." The above liquor is evaporated, mixed with sea salt, and the dry residue is heated until no more muriatic acid is disengaged. The residue is lixiviated, and the solution, consisting of sulphate and phosphate of soda, &c., is decanted, and quicklime added to it, about 118 lbs. to " about 220 lbs. of phosphate of soda, supposed to be dry," and frequently stirring for about 24 hours, when it is left " to deposit " the precipitate, which will be formed of phosphate of lime." The liquid decanted, " which besides caustic soda, may still con-" tain some sulphate of soda, may be used as a lye, or it may be " transformed into carbonate of soda by treating it with smoke " which has been previously washed." " By evaporating after-" wards and crystallizing," salts of soda are obtained. Chloride of potassium may be substituted for the chloride of sodium. " Any of the salts of potass or soda," having an acid displacable by phosphoric acid, as " nitrates, carbonates, acetates, or pyrolig-" nites, may also be employed."

[Printed, 4*d*. No Drawings.]

A.D. 1861, May 13.—Nº 1217.

CLARK, William.—(*A communication from Louis Joseph Frédéric Margueritte and Alfred Lalouël de Sourdeval.*)—" The " treatment of ammoniacal waters, resulting from putrified urines, " and from products extracted in the distillation of coal." This is said to consist as follows:—First, "obtaining ammoniacal salts "without employing evaporation." To the waste waters lime is added, to remove carbonic acid and sulphuretted hydrogen; the clear liquid "is introduced into a spirit rectifier," containing a "number of plates, over which the liquid flows; "the ammonia "disengages itself in a dry gaseous state," and "is collected by "means of concentrated hydrochloric or sulphuric acid," "the "greater part of the ammoniacal salt formed is deposited in a "crystalline state." The mother liquor is separated from the salt "by the action of a turbine." The mother waters, instead of being evaporated, may be absorbed into sawdust, &c., and sold as manure.

Second, "preparing insoluble carbonates in the economical "manner described," by employing carbonate of ammonia, resulting from impure water, to precipitate zinc, lead, copper, or alkaline carbonates from chlorides or sulphates; the mother water containing the ammonia salt may be evaporated or treated by a base, which sets the ammonia free to be treated in the spirit rectifier as above.

Third, "the preparation of carbonate of baryta by the re-"action of carbonate of ammonia distilled from the refuse waters "on sulphuret of barium."

Fourth, "the preparation of phosphates of baryta and lime, "for precipitating the waste water resulting from the distillation "of carbonate of ammonia by means of sulphuret of barium, "that of calcium by means of sulphate of lime, the chloride of "calcium." These phosphates are obtained as described under the fifth and sixth head.

Fifth, "the general and immediate precipitation of waste waters "clarified by means of sulphurets of barium and calcium for the "purpose of obtaining a mixed precipitate."

Sixth, "the filtration of waste waters through layers of sulphate "of lime which fixes the phosphoric acid, and also the ulterior "precipitation of the same waters by sulphuret of barium."

Seventh, "the extraction of sulphur from sulphates of baryta "and lime." There does not appear to be any direct process given for effecting this but under the head "preparation of sul-"phur." The sulphuret of ammonia, which can be obtained when sulphuret of barium obtained by calcining a mixture of sulphate of baryta and charcoal is precipitated by carbonate of ammonia, is exposed to "a hydrated peroxide of iron," and the ammonia liberated is distilled; "the sulphuret of iron being " regenerated by its exposure to the air can be employed a great " number of times." "When the quantity of sulphur precipitated " on the peroxide of iron" sensibly diminishes the action of this latter the mixture is to be gently calcined in a retort.

Eighth, "the distillation of carbonate of ammonia by means " of the spirit rectifying apparatus" arranged so that the ammoniacal waters are conducted to a superheater above, and are conducted into the first compartment of an evaporating column, passing "successively from plate to plate until they reach the " lower part, where the liquid resulting is drawn off." "The gas " and vapours follow the opposite course" and pass through analysing vessels into a condenser or otherwise. Instead of making sulphate of ammonia for agricultural purposes making " making "sulphites by the introduction of sulphurous acid to " the ammonia."

Ninth, "the extraction of a continuous current of waste water " from a current of ammonia by means of steam passing through " a Woulf's apparatus, and also passing it immediately through " heated sulphuric acid." The refuse water is in a series of receivers flowing in a contrary direction to the current of steam. " In the first receptacle where the steam enters the carbonate of " ammonia is driven off into the second receiver, and thence into " the third, and so on," by which arrangement the running of waste water from the first receptacle may be permitted. Two apparatus of large dimensions may be used in place of the above; in this way the operation "is intermittent."

Tenth, "mixing the ammoniacal water and sulphuric acid in a " closed vessel either at the ordinary temperature or at a temperature of 140° to 212° F., or at a pressure of one atmosphere." A closed boiler is "separated by a vertical partition into two " compartments, into one of which is placed the liquid ammonia " with the addition of lime, and in the other (lined with lead) " dilute sulphuric acid." "The ammonia is absorbed by the " sulphuric acid more or less rapidly according to the temperature."

Eleventh, applying "for the purpose of distilling ammonia and " carbonate of ammonia contained in refuse waters, putrified " urine, water of condensation, or other similar products," the spirit rectifier hitherto only employed for distilling alcohol.

Twelfth, preparing "bicarbonate of ammonia and its application " as a manure to agriculture." "The ammonia is first extracted

" from the stagnant or refuse waters, from water of gas works, " &c. &c.," and a solution of the same is saturated with carbonic acid produced by the combustion of charcoal, the bicarbonate precipitates in small brilliant crystals, which are collected and dried.

[Printed, 10*d.* Drawing.]

A.D. 1861, May 31.—N° 1367.

LAMING, Richard.—(*A communication from Joseph Mowbray Laming.*) — (*Provisional protection only.*) — " Improvements in " manufacturing alkaline carbonates." These are, mixing sulphate of soda or of potash " with some convenient carbonaceous " matter," and exposing " the mixture in a vessel to a furnace " heat," passing " through it a current of steam and a current of " air." " When sulphuretted hydrogen ceases to leave the vessel" the solid product is removed and the alkaline carbonate is dissolved out and obtained in the ordinary way.

[Printed, 4*d.* No Drawings.]

A.D. 1861, June 4.—N° 1411.

STANFORD, Edward Charles.—" Improvements in obtain- " ing products from seaweeds." These are, in reference to this subject, in place of burning seaweeds as heretofore, subjecting them to the action of destructive distillation and collecting the products. The seaweed dried in the open air or in sheds is formed into cakes by pressure and distilled, and the charcoal is withdrawn into closely covered iron boxes to cool, the whole of the iodine and potash of the seaweed are in the charcoal. The charcoal is lixiviated, and the solution treated by " the usual well- " known processes to separate the iodine and also the potash and " soda salts." The distillate consists of tar, water, and gas. The water holds in solution carbonate of ammonia, acetate of ammonia, &c. This liquid, " separated from the tar which sinks to the bottom, " is mixed with excess of lime and distilled in a capacious iron " still provided with a suitable condenser; ammonia and pyro- " acetic spirit pass over and are received into and saturated with " hydrochloric acid." " The solution of acetate of lime remaining " in the still is run out, evaporated to dryness, and the black " impure acetate of lime thus obtained may be purified by char- " ring and recrystallization by converting it into acetate of soda " by sulphate of soda, or by any of the well-known means." The ammoniacal distillate received into the hydrochloric acid above is redistilled until the sp. gr. of the distillate rises nearly to that of water best redistilled by steam "pyroacetic spirit" comes over which is redistilled over lime. "The solution of chloride of am-"monium remaining in the still is run out, evaporated, crystallized, "and the crystals sublimed according to the ordinary method of "making sal ammoniac of commerce."

[Printed, 4*d*. No Drawings.]

A.D. 1861, June 7.—N° 1448.

CROLL, Alexander Angus.—"Improvements in the manu-"facture of sulphate of alumina." These are, in place of treating the aluminous matters to be operated upon with "a comparatively "weak solution" of acid, and applying heat, as is "the method "generally adopted" in making "sulphate of alumina in the "form of cake," "the shale or other aluminous matter, as china "clay," powdered and by preference in a dry state, and also by preference heated until about 300° F., and while thus heated is treated with oil of vitriol of about 1·700 strength and heated to 300° F., "in the proportions of about 20 parts by weight of sul-"phuric acid to about 20 parts by weight of aluminous "matter." These matters are intimately mixed, retaining the heat in the mass "until the temperature is reduced to about "150° F., for which reason" it has been found that "the "operation is best conducted upon masses of not less than "5 tons, which may then be cut into the desired forms and sizes "of cakes."

When the sulphate of alumina is required for the manufacture of alum the process just described may be pursued, or the following:—The shale being roasted in the usual way is moistened with water at a temperature of about 212° F.; the whole mass is raised to that temperature, and "subjected to the action of sul-"phuric acid of about the strength, temperature, and relative "proportions above stated." The mass reduced to 212° F. is treated with boiling water for the sulphate of alumina for the manufacture of alum.

[Printed, 4*d*. No Drawings.]

A.D. 1861, June 8.—N° 1462.

ROMAN, Joseph.—(*Provisional protection only.*)—"Improve-"ments for economizing fuel in evaporating and concentrating,

" chiefly applicable to the manufacture of chemicals, and in the " apparatus connected therewith." These are, " economizing " heat in the manufacture of sulphuric acid, alkalies, salts, and " other substances," and " consists chiefly in constructing flues " of a shape resembling in longitudinal vertical section an " elongated blunt-pointed wedge, and in pans which are shallower " at one end than the other." " In applying this invention to a " black ash furnace," " in place of passing the heated gases off " through a flue shaft, as now generally practised, the rever- " beratory furnace arch is extended, say about sixteen feet " beyond the chamber" in which the crude materials are operated upon, " so as to cover almost half the length of an evaporating " pan." " A pier run to within about fourteen inches of the " under side of the arch separates the oven from the evaporating " pan which is set in and enclosed in suitable brickwork." " The " portion of the reverberatory arch which is over the enclosed " evaporating pan is carried down in an oblique line so as to " reduce the height from the upper edge of the pan to about " eight inches." " The remaining portion of the top of the flue " above the evaporating pan and the top of the down flue is " formed by the bottom of a suitably shaped pan, used for con- " centrating, say about twenty feet long, the bottom of which is " formed to coincide with the slope of the upper side of the flue." Modifications of the above are described, and " the heat generated, " say, in the manufacture of coke or burning of lime, may be " applied " for the above purposes and for generating steam."

[Printed, 4*d*. No Drawings.]

A.D. 1861, June 22.—N° 1611.

M^C^ARDLE, JAMES SMITH.—" Improvements in the treatment " of seaweeds for the purpose of obtaining therefrom certain " valuable products." These are, first, freshly gathered seaweed is washed " with water heated by steam for the purpose of " removing all saline matter," and piled into a heap it heats, ferments, and " the bulk of the materials becomes reduced. " During the heating process the mass of weed operated upon " must be kept dry." The mass is now reduced down to " obtain " the salts therefrom, leaving the alkaline and saline matter un- " affected." " The organic matters which are generally attached " to the crystals being removed by a slight charring the water " which is employed for washing after repeated use gets satu-

" rated," and is evaporated to " obtain the crystals held in " suspension."

Second, " in order to obtain the ammonia " which " exists to " the extent of about ½ per cent. in seaweed " the seaweed is mixed " with a caustic alkali, preferably potash, or with an " alkaline earth (lime)," and the mass subjected to distillation. The ammonia evolved " is condensed by means of sulphuric or " hydrochloric acid forming sulphates or muriates of ammonia." The residue from the stills is placed in a large box or case, and the remaining organic matter in it is charred by means of steam of high temperature while it is being agitated by an agitator. The dissolving pans are heated by steam introduced by pipes, and the liquors are crystallized. After separating the " sulphates, " muriates, and chlorides " the iodides and bromides are pre- " cipitated from the mother liquors by sulphate of copper, and " after the removal of the copper salts, sulphate of potash and " soda are crystallized out. The iodides and bromides are " distilled with sulphuric acid and peroxide of manganese, the " iodine passes into the condenser, the bromines is condensed further on by caustic potash. The sulphate of copper in the residue is recovered.

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 3.—N° 1695.

SPENCE, Peter.—" Improvements in economizing the manu- " facture of sulphuric acid, and in obtaining copper from ores " used in such manufacture." These are, using a furnace for the calcination of sulphur ores, of copper only, in which the ores are passed from one end to the other, during which transference a current of air is caused to travel over them in an opposite direction. The furnace in use is fifty feet long, with twelve doors for the transference of the ores. Above the fire chamber is the sole of the roasting chamber, with its doors on one or both sides. Above the fire chamber is an aperture for the admission of air into the calcining chamber. The ores are spread in layers two or three inches thick upon the bed of the calcining chamber, entering it at the door furthest from the fire; it is allowed to remain for about an hour, when it is transferred to the second position and a fresh charge is put into the first, " and so on, " waiting an hour between each charge." The sulphurous acid is conveyed through a channel to the ordinary sulphuric acid apparatus.

[Printed, 8*d*. Drawing.]

A.D. 1861, July 4.—N° 1,704.

WILSON, Thomas, and TATTERS, James Graham.—(*Provisional protection only*.)—" Improvements in treating tank refuse or " soda waste." These are, lixiviating it with hot water, and boiling it if necessary, filtering the liquor and adding to the filtered liquid " muriatic acid till all the sulphur is precipitated;" then decanting and drawing off the liquor, washing the sulphur " to " remove the acid; the sulphur is then dried."

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 6.—N° 1717.

SMITH, Robert Angus.—" Improvements in purifying gas." These are, " the purifying of gas from sulphur and its compounds, " except sulphuretted hydrogen, by treating it with alkaline solu- " tions of the metals " as follows :—The gas, in preference previously purified from sulphuretted hydrogen and carbonic acid, is passed through sawdust or other absorbent material, " moistened " with a solution of oxide of lead (or litharge) in caustic soda " (alkali), and arranged in thick layers in dry lime purifiers, after " the manner of oxide of iron." The more lead in the alkaline solution the better. " The sulphur (in the gas) combines with the " lead to form sulphide of lead. When the material is spent," the lead is recovered for further use by exposing the mixture for a few hours to the air, either in the purifier or out of it; the black " sulphide thereupon changes into the white sulphate of lead," to which fresh alkaline ley is added " to bring it again into solution " and make it fit to repeat its former service." " After several " alternations of this use and restoration the sawdust becomes " inconveniently full " of sulphate of the alkali used, which is washed out with water; " the metal and the sawdust are again thus " made available for use." " Instead of oxide lead, a saturated " solution of sulphate of lead, &c. may be substituted in the first " instance." " Instead of a compound of lead, oxide of zinc, " antimony, arsenic, or tin may be dissolved in the alkali," but the lead compound is preferred. " In place of either of the above " chemicals, the sawdust may be usefully moistened with a solu-

" tion of copper in ammonia, or if iron, in either organic acids or " other organic substances," as treacle, sugar, &c. Instead of using the substances in dry lime purifiers the gas may be subjected to scrubbing, by means of these solutions, but this is not preferred.

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 6.—N° 1722.

PASK, **William**.—" Procuring a coloring matter from the refuse " of ironstone, called colour spert." This consist as follows:— " A quantity of the mineral or refuse of ironstone," is put "into a " cast-iron mill, with iron or stone runners or rollers, fluted or " plain, worked by horse or steam or water power," and the whole is crushed to a fine powder and then washed in a tank, stirring by " hand or by a process called tossing or tozing;" when the colouring matter is suspended the liquid is drawn off from the gritty matter, and allowed to stand for some hours until the sediment has all sank to the bottom, when the liquid is drawn off and the sediment dried in a stove of fire-clay or brick " when the colouring " matter is perfected and rendered fit for use."

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 6.—N° 1726.

NOBLE, **Alfred**.—" Improvements in obtaining products from " alkali waste and gas lime refuse." These are, " the treatment " of alkali waste and the refuse from the lime purifiers of gas " works with sulphurous acid," as follows:—The alkali waste is placed loosely in a vat or heap so that the air may readily penetrate it, and occasionally sprinkled with water; in about three days it is turned over and left for about two days more, " sprinkling it with " water should it prove necessary." When the greenish colour of the waste is " fully developed the duration of the exposure has " been sufficient." The waste is then treated with water, and the solution allowed to trickle down over siliceous stones in a tower, " say, 20 feet high and 3 or 4 feet diameter," while " sulphurous " acid gas obtained by burning pyrites," or otherwise, is " intro- " duced into the bottom of the tower, and rises up through it." The gas should not be greater than the liquid will readily absorb; when there is an excess of acid in the liquid after passing through the tower, " some liquor which has not been so treated" is added

" until the excess of acid is absorbed or nearly so." "The liquor " is now left to stand until the sulphur which it contains in " suspension is deposited." The sulphur is then drained and dried, and is "then suitable for use for the manufacture of sul-" phuric acid" or otherwise. "The clear liquid may be evaporated " to obtain hyposulphite of lime," or it may be decomposed by carbonate of soda. The carbonate of lime removed, and the clear liquid evaporated for hyposulphite of soda; or "hydrochloric acid " may be added to the clear liquid from the tower until one-half of " the sulphur of the hyposulphite of lime is precipitated, the other " half remaining as free sulphurous acid," and original liquor is added until the acid is absorbed, and "the resulting mixture is " treated in the same manner as the liquid from the tower."

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 8.—N° 1732.

COBLEY, THOMAS.—"An improved process for the manufac-" ture of fluo-silicates and silicates of lead, and baryta, and for the " application of the same to various purposes in the arts and " manufactures." This consists in "the manufacture and use of " fluo-silicates of lead and baryta," as follows:—"Sand, glass, " flint, infusorial earth, slag, or any native silicated base," is reduced to a fine powder and mixed in chemical proportions with " finely ground fluor spar or any other compound containing " fluorine," and "sulphuric acid," or any other available acid is added, liquid or gaseous, in sufficient quantity to liberate the fluorine, and distilled; "the fluorine carries over the silica in the " form of fluo-silicic acid." Where fluorine can be obtained "as " a waste or bye product in a gaseous or in a liquid form" it is preferred "to any other ordinary sources." The fluosilicic acid thus obtained, gaseous or liquid, is added to "a basic solution of " lead and baryta, either hydrochloric, acetic, creosotic, or pyro-" ligneous, obtained by any means or from any source;" the precipitate is collected and may be used in pulp or dried. "Where it is " difficult to obtain the solutions, or the process is found too " tedious," hydrofluosilicic acid is mixed "with the oxides of " lead or caustic hydrate and carbonate of baryta to saturation " and boiled when dispatch is required," although "slow decom-" position at an ordinary temperature for most purposes is pre-" ferred." Fluosilicate of lead is also produced "by the action

" of fluoric acid or fluoric acid gas upon a silicate of lead. The " uses of these compound are in "the manufacture of glass or " porcelain either, as a glaze or as a pigment."

[Printed, 4*d* No Drawings.]

A.D. 1861, July 9.—N° 1734.

COBLEY, Thomas.—" An improved process for the treatment " of silicates of metallic and non-metallic bases, and other silicious compounds, as slags, scoriæ, and such like, in order to " recover the said bases, and also in the production of fluosilicic " and silicic acids." This consists in " the application of fluorine " for desilicising metallic and non-metallic bases," and in " the " manufacture and production of fluosilicic acid and silica by " the same process simultaneously, and in combination with the " process for desilicising mineral products," as follows :—Silicates, slags, or scoriæ of " gold, silver, copper, chrome, zinc, bismuth, " lead, potash, soda, alumina, or tin," are " reduced to a fine " powder and then mixed with a due proportion of fluor spar or " cryolite," or a mineral which contains fluorine, and the whole distilled in a retort, " so much sulphuric or other available acid " (liquid or gaseous), concentrated sulphuric acid preferred, having been added as will liberate the fluorine. The gas evolved," condensed in water, yields gelatinous silica and fluosilicic acid. When " fluorine, as a waste or bye product in a gaseous or in a " liquid form," can be obtained it is preferred " to any other " source." The fluosilicic acid as also the silica precipitated are applied " to the purposes of the arts." The bases thus freed from silica are treated " in various ways, according to their com- " position," &c.

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 15.—N° 1772.

COBLEY, Thomas.—" Improvements in the manufacture of " metallic and earthy silicates, or silicious compounds of the " same, from the metallic and earthy bases or their salts, and " soluble alkaline silicates, the formation of alkaline acetates or " caustic alkalies, and application of the same." These are, " forming silicates of lead, zinc, copper, baryta, or any other base " silicifiable by treatment with soluble alkaline silicates." In preference an acetic or muriatic solution of the base to be treated is brought "into any concentrated solution of the soluble alkaline " silicates, whereupon decomposition takes place and the insoluble " silicate is precipitated," the precipitate is washed and dried; " the acetic or muriatic solution resulting may be economized." Or, "the oxides or carbonates of the metals or the hydrated or " caustic earths," are treated " with a solution of the alkaline sili- " cates," thus forming an "insoluble precipitate which is collected, " and the caustic alkaline solution evaporated down" may be " applied to glass or soap making, or treated with carbonic acid " gas to form carbonates." The silicate of lead is employed "as " a pigment, or in glass making as a glaze or enamel;" the combined silicates of zinc and baryta as a substitute for lead, &c. &c.

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 15.—N° 1776.

COBLEY, Thomas.—" An improved process for the production " or manufacture of fluosilicates of tin, zinc, and baryta, and " their application as pigments for glazing, enamelling, and in the " manufacture of glass." To form fluosilicate of tin the oxide of tin is dissolved in fluosilicic acid, or a solution of a salt of tin is decomposed by means of fluosilicic acid, or silicate of tin is acted upon by means of fluoric acid. The fluosilicate thus formed is treated with sulphide of ammonium or sulphuretted hydrogen, so as to produce a sulphide which it is proposed "to apply as a pig- " ment, or glaze, or enamel, in the manufacture of porcelain, " either in combination with lead or separately, as the case may " be."

To form the fluosilicate of baryta this is done as described in N° 1732, 1861, also, "by acting upon silicate of baryta, either " native or artificial, with fluoric acid;" it is applied " either with " or without the fluosilicates of zinc, as a substitute for lead in the " manufacture of glass, or as a pigment or enamel in the manu- " facture of porcelain;" or it is applied " in the same manner in " combination with fluosilicate of tin."

To form fluosilicate of zinc the oxide of zinc is dissolved in fluosilicic acid, or " a solution of a salt of zinc is treated " with an " equivalent of the said acid," and the precipitate collected and dried; or silicate of zinc if free from iron is treated " with an " equivalent of fluoric acid." The fluosilicate of zinc is used as a glaze, or pigment, or enamel, either with or without baryta, but principally as a substitute for lead in glass manufacture, either alone or combined with baryta.

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 15.—N° 1783.

DE LA PROVOTAIS, EMILE GEORGES FERMIER.—" Extract-" the fibres from genista scoparia (broom) and their application to " manufacturing paper and fabrics, and also treating the washing " waters so as to obtain dyeing products therefrom." This " con-" sists of several operations, viz., collecting the broom; its hasty " retting in water heated by steam; its barking or decortication " by being passed between hard stone cylinders;" " its washing in " running water; its boiling in water heated by steam; its treat-" ment by alkalies or alkaline carbonates; its washing in water; " its treatment by chlorine or hypochlorites." The pulp is then ready for use. " By treating the washing matters which contain " gummy resinous matters," " picric acid and other coloring " products, and also salts," are obtained, with which are produced " green and yellow colors."

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 16.—N° 1790.

GILLARD, JOSEPH PIERRE.—(*Provisional protection only.*)— " Improvements in the manufacture of soda, carbonate of soda, and " hydrochloric acid, and in apparatus connected therewith." These are, " submitting common sea or rock salt (chloride of sodium), in " a suitable retort, to a high temperature, and projecting at the " same time on the salt " " jets or streams of superheated steam, " hydrogen gas, carbonic acid, or carbonic oxide gas," or suitable combinations of the same; hydrochloric acid is evolved and condensed, " whilst according to circumstances, either soda or car-" bonate of soda will be left behind in the retort." " The steam " or the other above-mentioned fluids " are superheated by causing " them to pass through tubes formed of a suitable alloy of " platinum and iridium " " inserted in a proper superheating " furnace, one or more layers of wire cloth made of the same " iridized platinum being situated in the interior of the said " tubes."

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 19.—N° 1819.

LAING, Robert, and COSSINS, George Horwood.—"An "improved mode of obtaining nitrous acid gas for making sul-"phuric acid." This consists, first, in using "arsenious acid or "arsenic acid to decompose nitrate of soda or nitrate of potash." The proportions preferred for nitrate of soda are "seven parts "nitrate of soda to five parts of arsenious acid, or six parts of "arsenic acid;" for nitrate of potash "seven parts nitrate of "potash to four parts of arsenious acid." In decomposing, preferring "to use a muffle or retort so placed as to be heated by "the furnaces or kilns in which the pyrites are burnt, and to "allow the gas to issue from the retort through a small bent tube "in the direction of the draught."

Second, decomposing nitrate of soda or of potash by chrome iron ore, the proportions "regulated by the per-centage of chromium "contained in the ore employed," and in preference "using a "small reverberatory furnace separate from the pyrites kiln."

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 25.—N° 1869.

HAEFFELY, Edward.—"Improvements in extracting copper "from its ores." These are, first, cupreous pyrites is thoroughly calcined in order that any remaining sulphur from ordinary calcining in making sulphuric acid should "be driven off as sulphurous "acid or oxidized," when the ore is placed in "a series of stone "vessels, so arranged that the liquid may pass from any con-"venient reservoir to the top of any one of th e series, and make "its exit at the bottom thereof into the top of the next series, "the whole arrangement being similar to that commonly em-"ployed for lixiviating soda ash." The lipuid employed is the residue from the manufacture of chlorine "when hydrochloric "acid and manganese have been used," and "generally thrown "away as valueless;" the solution thus obtained may be treated in any ordinary method, but it may be treated as follows:—

Second, the solution obtained above is made acid by an acid or or by some of the chlorine residue, diluted if necessary, and placed in a vat, and "vat waste from the manufacture of soda ash is "added so as to precipitate all the copper as sulphuret, which is "*collected* upon a sand or other filter, washed with water, "*drained*, dried in a reverberatory furnace or other suitable

" apparatus; after which it may be reduced, converted into " sulphate, or otherwise disposed of as may be desired."

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 3.—Nº 1935.

NEWTON, William Edward.—(*A communication from Paul Morin.*)—(*Provisional protection only.*)—" An inproved process for " producing colouring matters or pigments from manganese." This consists " in the production of a green color or pigment by " the treatment of oxide of manganese," the protoxide, with hydrochloric acid in a gaseous state. " For the purpose of producing " the protoxide, any oxide of manganese is to be treated by a " reducing gas," consisting of " hydrogen or a mixture of hydrogen " and carbonic oxide," and the protoxide " is to be well calcined " in an atmosphere charged with hydrochloric acid." "The " hydrochloric acid may be introduced into the apparatus either " in a gaseous state or in the state of solution in water, which " solution is evaporated under the influence of the high tempera- " ture which it is necessary to produce. The aqueous solution " will be especially preferable when charcoal is employed as the " reducing agent." " Manganese green may always be produced " by calcining any oxide, or even a suitable salt, having manganese " for its base in a reducing atmosphere saturated with hydro- " chloric acid gas at a bright red heat."

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 6.—Nº 1958.

SPENCE, Peter, and MELLOR, James.—(*Provisional protection only.*)—" Improvements in separating copper from its " ores." These, it is said, relate to a method of separating copper from its ores described in No. 2702, 1860, and it is stated that, " according to the method therein specified, the ores were so " changed in character by substances as to render the copper " soluble in an acid, and one of which substances became the " solvent." The plan now proposed "is another method of " carrying out the said principle, the design being to economize " the operation;" and to this effect submitting "the ores in " combination with an acid or other substances capable of acting " after the same manner to the action of heat in a furnace, so " that a condition of copper soluble in an acid is produced, which

" solvent we subsequently add so as to form salts." The ores as " they come from the manufacture of sulphuric acid, or in their " native state (after roasting)," are ground " previously to placing " them in the furnace."

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 15.—N° 2032.

MARTIN, John Cowdery.—" An improvement in treating " bones, and the manufacture of the products thereof." This consists in "treating bones with hydrochloric acid applied to " bones in succession, until the hydrochloric acid is saturated " with earthy phosphates and the obtaining phosphates or super- " phosphates from each saturated solution by evaporation," as follows:—The hydrochloric acid solution from the macerating vats is evaporated in shallow pans in preference of cast iron, " a " foot or eighteen inches deep, and of any convenient size," " fitted with a roof or dome of slate or vitrified brickwork or other " material capable of resisting the action of acid, to which is " connected two pipes to conduct the vapour, one into the " atmosphere, the other to a condensing worm." When the acid begins to come off with the steam, it is conducted through a pipe passing through a condensor, into a receiver partly filled with water. " Within the retort is an iron rake or agitator." The salts of lime after remaining at a red heat for five or six hours with agitation, having evolved nearly the whole of the hydrochloric acid, may then be withdrawn, " and any trace of acid yet remaining may be burnt out if required by a furnace open to the " atmosphere," preferring " a reverberatory furnace," bone ash is the result. In preference the phosphate or salt is washed on " the principle employed in washing the soda from black ash in " soda works." " If the phosphate is required white, it is to be " submitted to the action of the reverboratory furnace." When colour is not an object sulphuric acid is added, or before washing sulphuric acid is added and the acid is condensed.

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 22.—N° 2103.

RICHARDSON, Thomas, and IRVINE, Robert.—" Improve- " ments in the manufacture of paper." These are, " applying in " the manufacture of paper aluminous cakes obtained by acting

" on pit or alum shale or blaes either in a natural or roasted " state, or on those ashes of bituminous minerals which consist " chiefly of silicate of aluminia with sulphuric acid in substitution " of the alum or aluminous cakes heretofore employed, and which " is extracted and manufactured from the compound of shale " blaes or ashes and acid above mentioned at considerable cost."

When employing "the alum shales of Yorkshire which are now " thrown aside after the extraction of the sulphate of alumina by " the process at present in use," for preparing the crude aluminous cake, it is not required to calcine them. Also employing " those ashes of bituminous minerals which consist chiefly of " silicate of alumina, such as that left by burning bog head " coal." The residue after distilling these minerals is further calcined to burn off carbon, and it has been found advantageous before doing so to add 4 to 5 per cent. of ordinary muriatic acid, to assist "in removing a portion of the iron contained in such " ashes." The ashes are then reduced to powder by stones or rollers, passed through a sieve of "$\frac{1}{30}$th to the inch, 6 to 7 cwts. " of the ash are thrown into a box or pit, into which 5 to 6 cwt. " of sulphuric acid of 145° Twaddell, and heated to 309° or 350° " Fahrenheit, is running." The materials are stirred about, and in a short time a solid mass is obtained which is dried at a temperature about 212° F., and "crushed or ground, and may be " employed by makers of common brown papers in the same way " as they use other aluminous cakes."

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 26.—N° 2127.

TOLHAUSEN, Frederick. — (*A communication from Jean Baptiste Théodore Rousse.*)—(*Provisional protection only.*)—" A " new and economical method of producing dynamic electricity, " thereby obtaining useful chemical compounds."

"The principle of this method is based on this theory, that the " electro-motive power of a battery is proportional to the chemical " action that takes place by the contact of a metal and an acid, " which chemical action on the other hand is directly proportional " to the caloric evolved. First, by the oxydation or decomposi" tion of the metal by the acid. Second, by the combination of " the metal or metallic oxyd with the acid used, said chemical " action being inversely proportional to the absorption of caloric " produced by depolarization." In order to form a battery by this method, using "a metal or an alloy, and either a free acid or " an acid that is combined with an electro-negative metal, so as " to produce a very pure salt which may be used in the arts " directly or indirectly. The elements used in this battery are " iron, zinc, lead, copper, and silver; nitric, hydrochloric acids, " clorhydrate" [?] "sulphuric, acetic, and chronic" [chromic ?] " acids, nitric acid being used as a depolariser at the positive pole" [negative plate?] "yields the best results, because it depolarizes by absorbing the hydrogen with the least absorption of " caloric."

A "Bunsen's pile" is described, in which the nitrous fumes are absorbed by means of oleic acid, the light oils from tar, or non-siccative oils in a glazed stone vessel placed above the porous cell; the porous cell "is cup-shaped near the upper brim," so as to allow of the insertion of the absorbing vessel. The absorbing vessel is made of two cylinders connected by a perforated bottom; the upper portion of the carbon is of less diameter than the lower part, "so as to fit into the glazed stone vessel."

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 3.—N° 2196.

ROBERTSON, Patrick.—(*Provisional protection only.*)—"Improvements in treating yeast, and in the manufacture of ammoniacal salts, and a substitute for animal charcoal." These are, in reference to this subject, mixing "the yeast in a moist " state" with "clay and carbonate of lime or chalk, the mixture " is to be dried and then calcined." It is preferred that the mixture "should be such that the calcined product may contain, at " the rate of ten parts of carbon, eighty parts of clay, and ten " parts of chalk; but these proportions may be varied." "When " the substitute for animal charcoal is to be used for filtering " acids, the chalk may be left out, and only yeast and clay " employed."

"In calcining the above mixture, in order to obtain the substitute for animal charcoal, water, carbonate of ammonia, oils, " and gases are evolved," and the three first products condensed in a suitable receiver. The oils float on the water, which is " charged with the carbonate of ammonia, and which salt of " ammonia is changed into muriate or sulphate of ammonia in " the ordinary manner."

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 7.—N° 2238.

MAILLARD, Nicholas Doran Proby.—" Improvements in " the material and preparation of the material and apparatus for " making potash, pearlash, and caustic potash of commerce." These are, " the application and use of turf, peat, or bog earth " for making the vegetable ashes " from which the above substances are obtained, employing for burning the same furnaces " placed over an ash-pit, which is covered with a moving wire " screen or sieve, which, when shaken by means of a handle or " lever, sifts the ashes from the grate or furnace, and leaves them " fit for washing. In this ash-pit a wooden or iron truck is " placed, and when the truck is filled with sifted ashes, it is " drawn out of the ash-pit for washing, and another truck is " placed in the ash-pit to receive the ashes from the furnace." Constructing and using " drying floors or grates for drying the " turf, peat, or bog earth for burning," of " iron bars placed two " or three inches apart, or of wood or iron plates perforated to " admit heat," and placed " over flues, which are heated by the " furnaces which burn the turf," &c. These drying flues or grates are of any length or width. In lixiviating or washing, using pans or vats in which a stirrer or washer is placed. " This " washer consists of a vertical shaft with three or more arms. " This washer is worked round the pans or vats by horse, steam, " or other power."

[Printed, 6*d*. Drawing.]

A.D. 1861, September 14.—N° 2298.

MORRIS, Timothy, WEARE, Robert, and MONCKTON, Edward Henry Cradock.—" Improvements in batteries for " obtaining electric currents and the products therefrom." Battery cells may be made " of two or more divisions, one of which is " raised in order to act as a reservoir for the others."

" Earth or mineral batteries " are constructed " by digging a " suitable reservoir or reservoirs, and lining the same with glazed " brick or tile." A " mineral battery " may consist of oxide or " ore of copper " mixed with chloride of sodium, separated by a porous diaphragm of de-resinized wood or bark, from a dilute solution of sulphuric acid; carbon " electrodes " or plates are placed in each compartment, the result of the action of the battery " being the formation of sulphate of soda and chloride of "copper." In another "mineral battery" the same "electrodes" are placed in compartments, which respectively contain iron filings or iron ore, together with nitrate of soda or nitrate of potash, and dilute sulphuric acid; "the products will be sulphate "of soda or potash and nitrate of iron." A battery, with a raised division, may consist of chloride of copper in the raised division; in the next division chloride of copper with a carbon "electrode;" in the next cell chloride of calcium and a zinc plate. Chloride of zinc is formed in one cell and metallic copper in the other.

Carbon plates or vessels "may be prepared by pressure or by "uniting carbon with clay and burning it."

Batteries of these various descriptions may be combined "in "such manner that the electricity obtained from one may be used "to render the action of a second battery more powerful."

The conducting wires "may be covered with glass or any of its "compounds in any suitable manner."

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 20.—Nº 2351.

OLIVER, John, GRANTHAM, John, SINNOCK, William, and LEVERSON, Montague Richard.—"Improvements in "the mode of obtaining certain chemical substances, and in the "treatment of vegetable fibre, and in obtaining manurial and "other products therefrom." These are, in reference to this subject, first, obtaining carbonate and caustic soda and carbonate of lime as follows:—Sulphate of soda, obtained from whatever source, is ground and mixed with certain proportions of carbonate of lime and coal, and decomposed in a reverberatory furnace; "the ball or black ash thus obtained" is broken up and lixiviated with water, and the solutions are used "in the first and "second process to which the vegetable fibrous materials operated "upon are subjected, and also in preparing caustic alkali for the "subsequent treatment to which the vegetable fibrous materials "are subjected," by boiling "equivalent quantities of the above "alkaline solution and caustic hydrated lime together, and thus "obtaining caustic soda in solution, and carbonate of lime pre-"cipitated."

Second. Manufacturing hypochlorite of magnesia and sulphate of lime, in preference acting upon dolomite with sulphuric acid. The dolomite is first heated to expel moisture, ground, and treated with an equal weight of oil of vitriol in a close vessel, using the carbonic acid gas evolved "in the decomposition of the dolomite "to carbonate the caustic alkali adhering to or retained in the "interstitial spaces of the vegetable fibrous material," carbonated "for the purpose of dividing the fibres." The sulphate of magnesia washed out is decomposed by rather less than the equivalent of chloride of lime, thus forming hypochlorite of magnesia and sulphate of lime, to be used as a manure. Free chlorine is obtained by decomposing peroxide of manganese by hydrochloric acid, and brought in contact with hydrate of lime in close chambers, chloride of lime and chloride of calcium are formed.

[Printed, 6*d*. No Drawings.]

A.D. 1861, September 25.—N° 2396.

RICHARDSON, THOMAS.—(*Provisional protection only.*)—"Improvements in the manufacture of muriate of iron for the "purification of coal gas." These are, "dissolving the burnt "sulphur ore left as a waste product in the manufacture of sulphuric acid in muriatic acid, and evaporating the solution to "dryness; or in drying up the solution with sawdust, charcoal, "small coke, gypsum, the waste burnt sulphur ore ground to "powder, or any natural oxide of iron in powder, and in employing any of these mixtures with lime or magnesia in the usual "way in the purification of coal gas."

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 26.—N° 2408. (* *)

COURTOISE, MARIE FRANÇOIS ALEXANDRE.—(*Provisional protection refused.*)—Improvements in lime kilns. The kiln is made of an "elliptical truncated conical shape" inside and with "a gallery or colonnade of fire-bricks" which runs partially round the wall at the bottom and on which the fuel rests. The fuel is fed from without and the flame passes through the columns into the lime contained in the central chamber. In the brickwork of the gallery a flue is formed into which the outer air enters; there the air "becomes suitably heated and is projected on the fuel "through a quantity of small openings" at the inner side."

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 30.—N° 2441.

BOBŒUF, Pierre Alexis Francisse.—"The preparation "and application of certain new hemostatic and antiseptic "agents." "Take raw coal oil (peat or wood oils are equally "good), and stir into it, either cold or under a low heat, about "the sixth of its weight of caustic soda of 36°." Two layers are formed, the lower is named phenate of soda; water is added to this phenate "until it only marks 8 degrees Beaumé. Two layers "will again be formed. The lower layer is again the new phenate "of soda, and the upper layer a thick oil, which will become "reconstituted under the influence of the water." The new phenate is drawn off and water added "to bring it down to the "desired degree." "For fresh cuts and wounds apply it at a "strength of five degrees; for old wounds, which have ceased "bleeding, at two degrees only."

[Printed, 4*d*. No Drawings.]

A.D. 1861, October 4.—N° 2474.

STUART, James.—(*Provisional protection only.*)—"Improvements in the treatment of oils obtained by the distillation of "bones and other animal matters for the purpose of obtaining "matters which may be used as pigments and dye stuffs." These are, treating "common bone oil with hydrochloric acid or a solution of sulphuric acid," separating "the dirty acid" and treating "it with alkalies, when a substance is deposited which forms a "brown pigment." The oil thus treated "is then placed in a "retort with certain proportions of oxide of iron and carbonate "of potash; the whole is then distilled over until perfectly dry, "the product being refined oil, and the residuum left ferrocyanide of potash, and may be used as such, or converted into "Prussian blue." "The proportions used may be to each gallon "of oil one pound of hydrochloric acid or dilute sulphuric acid, "six ounces of oxide of iron, and eight ounces of carbonate of "potash," but the patentee does not bind himself "to the above "proportions."

[Printed, 4*d*. No Drawings.]

A.D. 1861, October 11.—N° 2540.

***KERNOT*, Charles Noyes, and RUCKER, Martin Diederich.**—"Improvements in the method of obtaining ammo-

" niacal salts and other valuable products from liquids or " substances containing ammonia, and for utilizing the residuum." These are, adding " to any liquor containing " ammonia (or in case of substances a solution thereof)" " crude " sulphate of zinc or other sulphates, or a liquid specially prepared from animal or mineral substances acted upon by a " solution of acid or acids, as bones and other phosphites " (phosphates ?) of lime and magnesia, coprolites, apatite, phosphorite, or other mineral phosphates being added, a copious " precipitate is thrown down. The liquor or solution can then " be passed through filters or drawn off. The precipitate is then " dried, and can be used as a fertilizing agent or for making " sulphates, muriates, and other salts and liquids of ammonia."

[Printed, 4*d*. No Drawings.]

A.D. 1861, October 18.—N° 2597.

ABEL, CHARLES DENTON.—(*A communication from Robert Rowland.*)—" Improvements in apparatus for the simultaneous " manufacture of white lead and vinegar." These are, first, " fitting the tops of vinegar vats (when said vats are placed in a " room below the corroding room) to the floor of the corroding " room" in "combination with covers provided with openings," through which a number of pipes are fitted, the openings being provided with " valves or any equivalent means for regulating the " supply of acid, or altogether closing up the communication " between the interior of the vats and the corroding room when " necessary," as during the removal of the white lead from the corroding room, " or during the placing of new lead in the same." Pipes admit " carbonic acid from a suitable generating apparatus " to the corroding chamber."

Second, " the employment of a steam pipe or pipes in the lead " corroding room." This pipe runs " through the corroding " room for the purpose of keeping up a uniform temperature of " from 150 to 170° F.," and is provided with a branch or branches provided with stopcocks for the admission of steam when necessary into the chamber.

Third, " the construction of the walls and roof of the lead " corroding room either wholly or partially of glass, mica, or " other suitable translucent and impervious material," to admit " a very large amount of light to the room." " The more readily

" is the carbonic acid decomposed and the carbonate of lead " formed," and a great deal of gas saved, " as wooden walls would " absorb a very considerable portion of it."

[Printed, 8*d*. Drawing.]

A.D. 1861, October 19.—N° 2607.

WEBSTER, James.—" Improvements in manufacturing oxygen " gas, and obtaining certain other products." These are, one part of nitrate of soda and two parts of sesquioxide of iron or burnt oxide of zinc, mixed together, are thrown into a red-hot retort and the heat kept up. The gas coming off "is passed " through water to extract the nitrous gas," and through a chamber containing a number of perforated trays " on which is " placed spent material from the generator after having been " moistened with water or steam. This acts as a purifier and " removes all nitrogen gas that may be with the oxygen." " The " gas then passes into the gasometer." In preference the spent material, " after a few charges of gas have passed through it," is removed to a chamber fitted with trays and exposed to fumes, " in " preference from metallic iron, nitric acid placed on a vessel at " the bottom of the chamber," " binoxide of nitrogen " is formed, which by exposure to air takes up oxygen " and converts the " soda in the trays into nitrate (nitrite?) or nitrate of soda ;" or the spent material whilst hot is thrown into water, and from this solution " crystallizing the undecomposed nitrite of soda (and " perhaps some nitrite (nitrate?)) from it, and the remaining " liquor containing caustic soda may be further boiled down to " hydrate of soda," " the oxide of iron or burnt oxide of zinc " will precipitate, and may be used again with other nitrates for " the manufacture of gas ;" " or the caustic soda solution may " have the acid from the first condenser (with perhaps a little " nitric acid added), when more nitrate of soda may be crystallized from it."

[Printed, 4*d*. No Drawings.]

A.D. 1861, October 28.—N° 2695.

McCLINTOCK, Emory.—(*Provisional protection only.*)— " Improvements in the manufacture of soda and sulphuric acid." These are, first, " fluxing of copper or any of its oxides or car- " bonates with sulphate of soda and coal or other carbonaceous

" material for the purposes aforesaid," and in the proportion, when oxide of copper is employed, of " seven parts of sulphate of " soda and eight parts of oxide of copper, and " three to three " and one half parts of coal slack, or an equivalent quantity of " any other carbonaceous matter."

Second. " Treating the fused mass so as to obtain therefrom " carbonate of soda and a residual sulphuret of copper," in the same way " as in the usual and well-known process " of soda making.

Third. " Treating the residual sulphuret so obtained in such a " way as to produce oxide or suboxide of copper, or metallic " copper, and sulphurous and sulphuric acids, or so as to produce " sulphate of copper," by roasting " the sulphuret in an ordinary " muffle oven either quickly and at a high temperature," by which oxide of copper is produced and sulphurous acid gas is evolved and is led into sulphuric acid chambers, or " slowly and at a low " temperature," by which " the sulphuret is converted into a " mixture of sulphate and oxide of copper;" this is decomposed either " by heating briskly, drawing off a mixture of sulphurous " and sulphuric acid," which is led into acid chambers, or it is treated " with boiling water to dissolve out the sulphate." According to the mode and time of roasting, the oxide obtained will contain a large proportion of suboxide and of metallic copper." " Steam always assists the evolution of sulphurous acid."

Fourth. Adding to the solution of sulphate of copper an equivalent of common salt, crystallizing out the sulphate of soda, and using lime or its carbonate or metallic iron for precipitating oxide, carbonate, or metallic copper.

[Printed, 4*d*. No Drawings.]

A.D. 1861, November 7.—N° 2801.

BARROW, JOHN. — " Improvements in the manufacture of " benzole, naptha, napthaline, aniline, and carbolic acid." These are, in reference to this subject " treating coal directly " with a view to the manufacture of these products, and by " avoiding as much as may be the production of gas." The " retorts, in preference " like ordinary iron gas retorts, are " set horizontally and in such a manner that while the bottom " and sides are capable of being heated to bright redness " the upper portion of the retort above the charge is carefully " protected by brickwork from fire and heat." Coal known in *the neighbourhood* of Wigan as cannel slack is preferred. The crude oils thus obtained are partially purified by one distillation; sometimes napthaline deposits, and is separated, dried, and purified by sublimation or otherwise. Aniline is separated by treating the crude oils with an acid, preferably hydrochloric; carbolic acid is separated by treating the oils with alkaline solutions, caustic soda preferred; from the acid solution of analine and alkaline solution of carbolic acid, aniline and carbolic acid are obtained, and purified by "any of the methods at present used by chemists."

[Printed, 4*d*. No Drawings.]

A.D. 1861, November 9.—N° 2819.

BROOMAN, Richard Archibald.—(*A communication from Edouard Aubertin.*)—"Improvements in obtaining alkaline phos-"phates." These are, "all mineral and animal substances con-"taining phosphate of lime, such as bones, animal black, "coprolites, phosphate of lime (apatite or phosphorites)" are "treated with a quantity of sulphuric acid in proportion to their "richness in phosphate and carbonate of lime;" the acid solution if containing iron is treated with prussiate of potash to throw down the iron, and the solution evaporated to a certain degree of concentration and "a salt of potash or soda formed by a volatile "acid, hydrochloric, carbonic, sulphuric, or nitric acid, for exam-"ple," added, and evaporation continued to perfect dryness the acid of the decomposed salt will be evolved, and phosphate of soda or potash will remain, to obtain which pure "the mass is to be "redissolved and crystallized once or twice." If phosphate of lime and soda are desired "the mass must be redissolved and "treated with milk of lime; phosphate of lime will be formed "and the soda will be found free in the liquid," and "may be "utilized in this state by concentrating the solution; but it may "be transformed into carbonate by passing into the solution a "current of carbonic acid and concentrating the liquid to allow "the alkaline salt to crystallize."

[Printed, 4*d*. No Drawings.]

A.D. 1861, November 13.—N° 2855.

BALMAIN, William Henry, and KEAN, John.—"Improve-"ments in the manufacture of flowers of sulphur, and roll and "*other forms* of sulphur." These are, "the introduction of the "*raw sulphur* or brimstone to the subliming pots in the melted

" state," whereby the process is worked "continuously and the " introduction of air during the process is prevented." This is effected " by means of a pipe which connects the working pot with " a separate pot, in which the brimstone or sulphur is melted, and " is kept at such a level as will ensure that the communicating " pipe shall be full of sulphur." It has been found "convenient " to adapt to the supply pipe a tap or cock, or other means " whereby the flow of sulphur from the melting to the working " pot may be checked, regulated, or arrested when desired," but this is not deemed essential. " Instead of using a separate pot in " which to melt the brimstone," sometimes inserting "a vertical " tube of 12 or 18 inches or thereabouts in width into the working pot, through a hole made in the top of a pot much larger " than the head, in order to receive it." "Or the tube may be " inserted at an angle through the side of an ordinary pot and " made of such length that it shall always dip in the melted " sulphur in the pot, so as to prevent any access of air by closing " the bottom of it." The outer end of this tube being open, by this means a constant supply of raw sulphur can be kept up without opening the pot.

[Printed, 4*d*. No Drawings.]

A.D. 1861, November 14.—N° 2871.

HUGHES, Frederick Robert, and RICHARDSON, Thomas. —(*Provisional protection only.*)—" Improvements in treating certain natural saline compounds to fit them for agricultural use, " and in order to obtain potash and other salts." These are, steeping "in a small quantity of cold water" these "natural saline " compounds," "found at Stassfurth, in the Duchy of Magdeburg," and "known as dungsälz or abraumsälz," and "which " are found in other places," for the purpose of removing "a " deliquescent salt (muriate of magnesia)," or heating "these " natural compounds with or without steam, so as to decompose " the greater part of the muriate of magnesia, and the residual " mixture of salts from either process having by these means lost " its deliquescent properties is suitable for application as a " manure." "The mode of separating the potash salts may be " varied," but the following is believed "to be the most convenient :"—The residue, after either of the above treatments, is " steeped in a small quantity of hot water, by which the chloride " of potassium is dissolved out; the residue, if containing sulphate

" of potash, is then subjected to the well known process in alkali " works for converting the sulphate of potash into sulphuret to " facilitate its being separated from the common salt." Instead of the above, dissolving the crude salts and separating the potash salts by salting and crystallization as in " obtaining potash salts " from kelp;" or sulphate of alumina is added and " the potash " removed in the form of potash alum;" or by nitrate of soda or other suitable nitrate, or by the use of sulphuric or muriatic acid.

[Printed, 4*d*. No Drawings.]

A.D. 1861, November 19.—Nº 2906.

DÉDÉ, Simon.—(*Provisional protection only.*)—" A new process " of discoloring, purifying, and improving varnish, oil, resin, gum, " ether, wines, spirits, and other matters, through the application " of compressed air." It is stated that among a number of purposes named, " compressed air is applicable to acid fermentation " (manufacture of vinegar), and gives strength and aroma to the " vinegar in a most economical manner, the fermentation taking " place in a closed vessel, instead of the circulation of air in the " ordinary method, by which the alcoholic part is carried off, and " it is so much weakened." " The operation is carried on in " wooden vessels," " the liquid submitted to the necessary pres- " sure of air is kept in agitation by any suitable means, in order " to hasten the fermentation by presenting its different parts " successively to the action of the compressed air." " The " apparatus necessary to give the required pressure of air " in the vessels, " consists of a double action pump (a force and suction pump). The air is dried before it is forced into the vessels, by means of " chloride of calcium, plaster, quicklime, or other " substance " contained " in a metallic reservoir." " After a " certain lapse of time, the air which acts upon the substances " loses its discolouring action," in which case a vacuum is obtained by the aid of the pump, and the vessels are recharged with air.

[Printed, 4*d*. No Drawings.]

A.D. 1861, November 20.—Nº 2920.

JOHNSON, John Henry.—(*A communication from Adrien Muller.*)—" Improvements in the treatment of zinc ores, and in

" the apparatus employed therein, which improvements are also " applicable to the manufacture of phosphorus." These are, subjecting such ores with proper fluxes to an elevated temperature, in ovens " made with two tiers or sets of floors one above another, " and the materials to be heated, are first laid upon the upper " floor, and gradually raked down through a vertical opening on " to the lower and more highly heated floor" before introducing them into the blast furnace. The ovens are " on a level with the " mouth of the blast furnace, so that the charges may be intro- " duced into the furnace direct from the oven without chilling " the same in the transit." The furnace should be maintained at a temperature not lower than that which " will effect the " reduction of the oxide of zinc by the carbon or fuel." " Suit- " able condensers, culverts, and depositing chambers are placed " in connection with the blast furnace, so as to allow the gases to " deposit the metallic zinc and oxides, the fixed metals being " tapped out from the bottom of the blast furnace." " By " applying this process to the neutral or other phosphates," silicic acid liberates " phosphoric acid, which is reduced by the " charcoal, and the phosphorus will distil over with the gases," and is condensed in suitable apparatus. " It is also proposed to " burn the mixed gases issuing from the blast furnace, and con- " taining metallic zinc, so as to form oxide of zinc, which may " be collected in suitable condensing apparatus."

[Printed, 8*d*. Drawing.]

A.D. 1861, November 21.—N° 2926.

STUBBS, JOHN.—(*Provisional protection only*.)—" Improve- " ments in apparatus for heating and evaporating brine in the " manufacture of salt." These are, constructing and arranging apparatus for the above purpose, as follows:—" A large shallow " wrought-iron evaporating pan, as ordinarily used, heated by a " suitable fire-place or fire-places situate at one end of the pan, " and within these fire-places and flues are placed a number of " iron tubes in connection with the evaporating pan, so that the " brine liquor may be heated as it passes through them on its " way to the pan, in lieu of being supplied at the ordinary " temperature."

[Printed, 4*d*. No Drawings.]

A.D. 1861, November 28.—N° 3002.

SPENCE, Peter.—" Improvements in the treatment of ores for " the manufacture of sulphuric acid, and in apparatus connected " therewith, which apparatus is also applicable to the treatment " of ores for separating metals therefrom." These are, first, " in reference to the manufacture of sulphuric acid, and as applied to the treatment of ores, which are not classed as copper ores, the use of the furnace substantially as described (see No. 1695, 1861), and " provided with means for allowing a current of air to " pass over the material under operation, whether such current " be in the same or contrary direction to the passage of the said " material."

Second. As applied to No. 1695, 1861, and which " has " reference to copper ores only," " causing a current of air to " pass in the same direction as the material."

Third. The furnace for " calcinining ores, from which copper " or other metal is to be extracted." The furnace is the same as described in No. 1695, 1861, only when the current of air is made " to travel in the same direction with the material, the materials " mixed with common salt, sulphate of iron, sulphuric acid, or " other substances," and ground, are placed first in that part of the furnace over the fire, and are moved step by step to the end, and the exit for the sulphurous vapour is situated above the fire-place.

[Printed, 8*d*. Drawing.]

A.D. 1861, December 4.—N° 3043.

BALMAIN, William Henry.—" Improvements in the manu- " facture of potash and salts of potash." These are, " the use " of spent bark or other woody fibre, from which tannin or other " colouring matter has been extracted, as a source from which " potash or the salts of potash may be obtained," by incinerating them or the charcoal obtained from them, and " then lixiviating " the residuum, after which, the salts may be obtained from the " solution in any of the well-known manners. Or the residuum " may be applied without lixiviation direct to the formation of " salts of potash, by the addition of suitable acids, according to " the particuluar salts required. Or the impure potash may be " applied to uses for which such salts of potash may be " required."

[Printed, 4*d*. No Drawings.]

A.D. 1861, December 7.—N° 3076.

GERLAND, Balthasar Wilhelm.—"Improvements in the "manufacture of sulphate of copper and other salts of the same "metal." These are, first, manufacturing "sulphate and other "salts of copper from that description of ore known as mala- "chite."

Second, "the use of malachite or other carbonate of copper, "and also of oxide of copper, for precipitating iron and other "metals from cupreous solutions."

"The malachite is dissolved in the acid according to the salt "required, say sulphuric acid," and when heated a further quantity of finely powdered malachite is added "until the free acid is "neutralized, and the iron and other base metals precipitated." If muriatic acid was used the carbonate of copper should not be in excess, "as this would form an insoluble basic salt, and thus "occasion a loss of copper." The iron should be peroxidized before precipitation, "as its separation in this state is more expe- "ditious." If arsenic or phosphoric acid are in the solution, in preference "combining the same with oxide of iron or alumina, "and then applying the carbonate of copper as above described." The solution removed from the precipitate is sulphate of copper, and is used in this state or evaporated and crystallized.

[Printed, 4*d*. No Drawings.]

A.D. 1861, December 31.—N° 3275.

BROOMAN, Richard Archibald.—(*A communication from Absalon Hippolyte Leplay and Jules François Joseph Cuisinier.*)— "Improvements in revivifying animal black or charcoal, in col- "lecting ammoniacal gases generated in the revivification, in the "clarification of saccharine liquors, and in apparatus employed in "the revivification of the black, and in the filtering of saccharine "liquors." These are, in reference to this subject, when the filter of black no longer purifies the liquor, the liquor in the filter is allowed to run out, and a jet of steam is introduced at the lower part of the filter; as soon as the steam reaches the upper part of the filter the ammonia is given off. "The disengagement of "the ammoniacal vapours may be facilitated by adding on the "filter a few quarts of a milk of lime at the time the saccharine "liquor is allowed to flow out through the bottom of the filter." "In order to increase in animal black the property of absorbing

" lime, and to render the revivifying of this property less frequent," the following means are adopted, namely, " placing the black in " grains in contact with a solution of phosphate of lime with one " proportion of lime," or sometimes phosphate of magnesia. This solution is run into the filter so as to cover the black, and when " in contact with the black for some instants " it is allowed to run out, and it is collected and used over again for a similar purpose. The filter is ready for use. Hydrochloric and sulphuric acids may be used for revivifying animal black, but should steam and milk of lime become weak in revivifying, " a boiling solution " of carbonate of soda, or even of caustic soda, of from 3 to 6 " degrees Baumé density," in contact with it for an hour, increases its energy. The solution of soda is run off and steam is injected " to dispel all traces of ammonia," and the black is afterwards washed with water and the acid phosphate or the hydrochloric acid. These processes of revivification, it is stated, may be conducted in ordinary filters, but two conical filters adapted for the purpose are described. " Employment of animal black in " powder." Taking " three parts of phosphate of lime with one " proportion of lime dissolved in water, and mix the solution " with finely powdered animal black ; the phosphate of lime with " three parts of lime which constitutes the base of animal black " is destroyed, and a mixture is obtained containing phosphate " with one proportion of lime, and phosphate with two proportions of lime." This phosphate with two proportions of lime becomes soluble in a solution of phosphates with one proportion of lime, and if this solution be diluted and poured carefully " on " defecated beet juice an abundant gelatinous precipitate " falls, which is the tribasic phosphate, and the decolorized and clarified juice will be found free or nearly so of lime. When " the absorbing and decolorizing properties of the black have been completely exhausted " it " may then be advantageously used as a " manure." " It may be utilized in the preparation of phosphate " of lime with one proportion of lime after having been calcined " in the open air. Even in case of need, it may be regenerated " by boiling it with a solution of caustic soda," and thoroughly washed, is revivified " by the solution of phosphate with one proportion of lime." " The phosphate with one proportion of " lime may be prepared by burning at a white heat the animal " black in contact with the air, and by treating the calcined product with two proportions of sulphuric acid," two proportions of lime, sulphate of lime, become formed and precipitated, and one proportion remains in solution." This solution may be employed as it is or concentrated to eliminate a little of the sulphate of lime. Sometimes adding to the animal black "the same quantity of " sulphuric acid the sulphate of lime carries down the black in " precipitating." The phosphate of lime is in solution with one proportion of lime.

[Printed, 1*s.* 2*d.* Drawings.]

1862.

A.D. 1862, January 4.—N° 37.

WARNER, Arthur.—(*Letters Patent void for want of Final Specification.*)—" Improvements in preparing materials for and in " purifying coal gas." These are, " employing in the purification " of coal gas the cinders or oxide of iron obtained from puddling, " re-heating, and refining furnaces used in the manufacture of " iron, and which are now for the most part waste products in " such manufacture." To render these materials " suitable for " the purification of coal gas, such oxide materials or cinders are " ground to reduce them to powder, and are then washed in " water. The prepared materials are used in apparatus such as " are employed when purifying gas by what are known as the dry " processes."

[Printed, 4*d.* No Drawings.]

A.D. 1862, January 13.—N° 90.

WARLICH, Ferdinand Charles.—" Improvements in the " manufacture of artificial fuel." These are, in reference to this subject, collecting " of coal tar and other distillates (ammoniacal " liquors), during the process of torrefying, bituminous coal for " the manufacture of block fuel." The retorts in which small coal is placed are " hermetically closed by properly luted doors " and composed of fire-bricks with fire-tiled bottoms, and heated " on one or more sides by means of fire-places provided with " suitable flues." The gases are drawn off by a fan, &c., and conveyed through refrigerators in which the tar and ammoniacal products are condensed, and the gases pass off to torrefiers which are in preference long and shallow brick retorts ; or the gases may be used "for the purpose of heating the retorts in which the dis-" tillation of coal is effected."

[Printed, 4*d*. No Drawings.]

A.D. 1862, January 15.—N° 113.

CLELAND, WILLIAM.—" Improvements in treating and utiliz-" ing certain materials used and products obtained in the manu-" facture of gas, and in apparatus connected with the said treat-" ment." These are, first, "the use of ordinary horizontal gas " retorts," for "distilling or subliming off the sulphur from the " 'spent oxides' of iron that have been used for purifying gas, " with the exception of the magnetic oxide and carbide of iron " and spathose iron ore." "This exception does not relate to " any of the claims herein-after stated." "The distillation or " sublimation of sulphur from spent oxides as above by means of " vertical or inclined retorts in which the process if desired may " go on continuously." "Utilizing by distillation and sublima-" tion the ammonia or ammoniacal compounds contained in spent " oxides of iron ;" "the use of waste heat from the arches or " ovens of gas retorts for the above-named purposes ;" the "direct " production by distillation and sublimation of roll or stick " sulphur, and flowers of sulphur, from spent oxides of iron."

Second. "The extraction of sulphur from spent oxides of iron " by fusion and pressure."

Third. "The extraction of sulphur from spent oxides by diges-" tion," in "hot oil, hot caustic potash, or turpentine ;" the sulphur is separated by "agitation, subsidence, and decantation." The crystals are thrown on a filter, &c.

Fourth. "The extraction of ammonia and ammoniacal com-" pounds from spent oxides of iron by lixiviating with water."

Fifth. "The production of sulphurous acid gas from spent " oxides of iron by self-sustained combustion," and "the utiliza-" tion of the ammonia given off by spent oxides of iron while " burning," by "cooling, by a porous material or by other suitable " means or apparatus" placed in the passage of the gas.

Sixth. "The production of sulphates of iron directly from spent " oxides of iron" when heated with limited access of air ; a tem-perature of about 600° F. answers well," but "a dull red heat and " much higher heats may be used." The production of sulphides of iron by heating in the absence of air such spent oxides of iron as do not yield free sulphur by ordinary distillation or sublimation. The production of "sulphides of iron from spent oxides " of iron by mixing the latter with metallic iron minutely divided " and water." The production of "sulphides of iron from spent " oxides of iron by adding metallic iron and fusing the sulphur " in the mixture." "The use or application of any or all of the " sulphides," "as obtained under the first and this sixth head. " for the production of sulphates of iron." "The application of " 'spent oxides of iron' for the manufacture of sulphate and " sulphite of ammonia," by exposing them in various ways to air, steam, &c.

Seventh. "The use of" spent oxides of iron "for the manufacture of sulphate of alumina and alum either directly or by " previous conversion into sulphide of iron or into sulphate of " iron."

Eighth. "The use of" spent oxides of iron, "for the manufacture of sulphate of soda, sulphuret of sodium, and carbonate " of soda, either directly or by conversion into sulphide of iron or " into sulphate of iron."

Ninth. "The use of the oxides of iron and other materials " resulting from the foregoing processes under the first, second, " third, fourth, fifth, sixth, seventh, previous and eighth heads for " the manufacture of pigments."

Tenth. "The use of the residual oxides of iron from the second " third, fourth, and sixth heads," also "the use of the crude " sulphate from the sixth head, for the purification of gas." "The " use of the burnt oxides of iron from the fifth, eighth, and ninth " heads (when any is available from the latter) for the purification " of gas."

Eleventh. "Utilizing the ammoniacal vapours given off by " oxides of iron undergoing revivification substantially" as follows:—"By passing a gentle current of air through the reviving " materials, and afterwards passing this charged air through any " porous material that will absorb the ammonia."

[Printed, 1*s.* 6*d.* Drawing.]

A.D. 1862, January 18.—N° 139.

ROBERTS, THOMAS, and DALE, JOHN.—"Improvements in " the manufacture of gunpowder." These are, "the use in the " manufacture of gunpowder of sulphate of soda or other

" efflorescent substance in combination with nitrate of soda." " In order to obtain the anhydrous sulphate of soda " crystallized sulphate of soda is placed " in a stove, at a sufficient temperature " to drive off the whole of the moisture;" and supposing that nitrate of soda is used " entirely, instead of nitrate of potash," there is added " a proportion of the anhydrous sulphate of soda, " not exceeding eighteen per cent. of the nitrate, but less quantities " may be used; and when mixtures of nitrate of potash and " nitrate of soda are used, the proportion of the anhydrous salt " to be added should be in such quantity as not to exceed eighteen " per cent. of the nitrate of soda contained in the mixture, in " order that the quantity of oxygen usually present in the materials " used in the manufacture of gunpowder may be maintained; " the above ingredients are made into gunpowder in the usual " manner."

[Printed, 4*d*. No Drawings.]

A.D. 1862, January 28.—N° 220.

CHURCH, Arthur Herbert.—" Improvements in the means " of preserving stone, brick, slate, wood, cement, stucco, plaster, " whitewash, and colourwash from the injurious action of atmo- " spheric and other influences; also in the application of colours " to the surfaces of stone, brick, slate, wood, cement, stucco, " mortar, clay, plaster of Paris, plaster, whitewash, and colour- " wash, and in the retention of such colours therefrom." These are, first, " the exclusive use of a solution of silica in water when " preceded or followed by a solution of baryta or strontia in " water; that is to say, the successive or consecutive employment " of such solutions " for any of the above purposes.

Second, " the exclusive use of the mixture of a solution of " silicate of potash or soda, with sulphuric, hydrochloric, or other " common and suitable acid (and which mixture may be regarded " as an impure mixture of silica), preceded or followed by a solu- " tion of baryta or strontia," for the above purposes.

Stone and the other herein-before mentioned materials are impregnated first with a solution of baryta or strontia in water, but preferably with a solution of baryta, the strength varying with the nature of the material operated upon, prepared by slaking caustic baryta or strontia with water, adding more water, and boiling this paste with water so as to form a saturated solution. The solution of silica is prepared by taking "one volume of a strong "solution of silicate of potash or soda of sp. gr. 1·5 or there- "abouts, and having diluted it with two volumes of water," and rendered the solution strongly acid with sulphuric, hydrochloric, or other acid, this liquid is placed in a dialyser floating in rain or distilled water, and when the acid and salts have diffused away the remaining solution of silica is employed.

[Printed, 4*d*. No Drawings.]

A.D. 1862, January 31.—N° 264.

MONCKTON, Edward Henry Cradock.—"Improvements "in the application of electricity for obtaining ammonia and "other useful products during the combustion of coal and fuel, "and in the apparatus employed therein." These are, forming "an electric bath by applying the electric current, however gene- "rated, and with or without the use of induction or tension coils "or Leyden jars, or substitutes for Leyden jars, such as the con- "densers of electricity attached to tension coils, to natural and "artificial graphite and plumbago, and also to the coal and fuel "in ordinary furnaces of all descriptions, such as, for example, "blast furnaces for smelting, or furnaces for heating engine boilers, "&c.," or those specially made. The simplest method is, "by "means of wires and iron rods, or chains, or pieces of graphite, "or plumbago to the coal or other fuel in the furnace." Steam is introduced into furnace along with air, so as to create a blast. The nitrogen of the "air combining with the hydrogen of the "steam will form ammonia; the oxygen eliminated will oxidise "the coal; any nascent carbon combining with the ammonia "form a carbonate." "Any sulphur in the coal uniting with "the oxygen will become sulphuric acid," and meeting, to form sulphate of ammonia. Any ammonia may be brought into contact and united "with the sulphuric, nitric, or muriatic acids." "Free nitrogen may be united with caustic alkalies or their solu- "tions, or any cyanogen formed," similarly combined. When crude ores are smelted, "sulphuric acid could be largely and "rapidly formed from sulphurous ores." This process is also applicable where an intense heat is necessary, as in "the reduction "of aluminium direct from aluminous clays, by the addition of "suitable fluxes."

[Printed, 4*d*. No Drawings.]

A.D. 1862, February 12.—N° 371.

JOSEPH, John Stephen.—"Improvements in coke ovens, and "in utilizing the waste heat from the same." These are, first, "the construction of coke ovens having external chambers at the "top, and flues leading from these and surrounding the sides and "bottom of the oven into which the combustible gases enter, and "are there caused to undergo more or less complete combustion "by being brought into contact with jets of atmospheric air which "enter the said external chambers and flues, other jets of air "being also caused to enter the ovens themselves for the same "object." The jets of atmospheric air are introduced "through "small orifices in the brickwork," at suitable distances, into the "chambers, flues, or channels through which the gases pass."

Second. "The employment of the spare heat resulting from the "above-described combustion of gases" in the above coke ovens "for generating steam in boilers, for making illuminating gas in "retorts, for firing pottery, for heating drying stoves, for calcining "ores, and for burning lime."

[Printed, 8*d*. Drawing.]

A.D. 1862, February 13.—N° 376.

JOSEPH, John Stephen.—"An improved retort oven, and "the utilization of the spare heat from the same." These are, first, "the construction of ovens for making coke, charcoal, or "other similar processes, by which combustible gases are disengaged," of "such a tranverse sectional form as to require "little or no support from the sides, and which are completely "surrounded, except at the ends, by a chamber in which the "gases proceeding from the interior of the ovens are caused to "undergo more or less complete combustion by the introduction "of a number of small jets of air into the said chamber, other jets "of air being also introduced into the ovens themselves," for the purpose of causing a more or less complete combustion of the combustible gases. The retort is "of a catenary, parabolic, or "elliptic transverse sectional form," but it may be of "any transverse sectional form that will stand firmly by itself, without "requiring any material support for the sides."

Second. "The employment of the spare heat generated by the "combustion of the combustible gases" in the above oven, "for

" making illuminating gas, for heating drying stoves, for firing " pottery, for calcining ores, or for burning bricks or lime."

[Printed, 8*d*. Drawing.]

A.D. 1862, March 1.—N° 564.

ROBERTSON, **Patrick**.—(*Provisional protection only.*)—" Improvements in treating yeast, and in the manufacture of ammoniacal salts, and a substitute for animal charcoal." These are, in reference to this subject, " the yeast in a moist state is mixed " with clay and carbonate of lime or chalk; the mixture is to be " dried and then calcined." The calcined product in preference should contain " 10 parts of carbon, 80 parts of clay, and 10 parts " of chalk, but these proportions may be varied." " When the " substitute for animal charcoal is to be used for filtering acids " the chalk may be left out, and only yeast and clay employed." In calcining the above mixture, " water, carbonate of ammonia, " oils, and gases are evolved " and received in condensers. " The " oils float on the water, which is charged with the carbonate of " ammonia, and which salt of ammonia is changed into muriate " or sulphate in the ordinary manner."

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 3.—N° 581.

BISCHOF, **Gustav**, junior.—(*Provisional protection only.*)—" Improvements in treating ores and solutions containing copper " and iron, or either of them, to obtain products therefrom." These are, as follows:—When solutions contain both sulphates of iron and copper they are treated with " chloride of calcium or " other chloride of an alkaline earth, or of an alkali which is " capable of separating the sulphuric acid " from these sulphates, in almost every case employing chloride of calcium. In this manner chlorides of copper and of iron are in solution, and the sulphate, soluble or otherwise, is separated. To this chloride solution is added " lime, magnesia, or baryta; lime or a mixture of " lime and magnesia will, however, be most practically useful." In this manner is obtained " oxide of copper and oxide of iron, or " one of these."

When treating a mixed solution of sulphate of copper and of iron " to obtain separately the oxide of copper and the oxide of " iron," adding to the solution " preferably to the mixed chloride

" solution obtained therefrom " oxide of copper, which dissolving the oxide of iron is precipitated and separated, and the remaining chloride solution is treated as above for oxide of copper. " In this " last process, in place of oxide of copper, ore known as atacamite " may be employed." " The copper may be obtained as compa-" ratively pure oxide from oxide and carbonate ores."

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 10.—N° 638.

DUNCAN, James.—(*Provisional protection only.*)—" Improve-" ments in the manufacture of vinegar." These are, " weak " saccharine liquors consisting of what are known as charcoal " washings or charwashings, steamings of casks, bag filter wash-" ings, and the sweet waters of sugar refiners' are used," and mixed together should form " solutions of not higher gravity than " about 30° Beaumé." These solutions, almost invariably acid, " are neutralized or even rendered slightly alkaline " by a caustic or an alkaline earth, lime, its hydrate or carbonate preferred, and fermented in tuns with yeast, sometimes " German yeast in the " state of cream. The solutions are kept at a suitable temperature " till the vinous fermentation is completed." In some cases adding " to the yeast a suitable quantity of wheaten, barley, or " other similar flour or other nitrogenous matter." The alcoholic liquid is acidified by " the well-known arrangements used " in ordinary vinegar manufacture." " When the acetic fer-" mentation has been completed any lime, baryta, or strontia " is precipitated by adding to these liquors " the requisite amount of " sulphuric or oxalic acid, great care being taken to avoid adding " any excess." " The liquors are then either at once filtered or " allowed to stand till the whole of the sediment has been " deposited, when the fine vinegar may be drawn off."

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 17.—N° 735.

TODD, Brereton. — " Improvements in the manufacture of " antimony and the oxide of antimony." These are, " burning " the sulphide or the oxysulphide of antimony by throwing it on " a fire in a furnace or by mixing it with a carbonaceous substance " and burning it in a crucible, retort, or furnace, and causing the " *ascending* vapours to pass with a current of air through flues

" or condensors, by which process all the antimony contained in " the ore will be deposited in the said condensors or flues in the " state of oxide, and the sulphur volatilized in the state of sul- " phurous acid gas." To manufacture antimony, "the oxide of " antimony obtained in the flues and condensors by the above " process is to be mixed with a carbonaceous substance and " alkali, and smelted in crucibles, or in a retort or furnace so " arranged that any fumes arising from the process of reduction " may pass into flues or condensers to be deposited."

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 17.—N° 742.

GOSSAGE, WILLIAM.—" Improvements in the manufacture of " soda and potash." These are, manufacturing caustic soda and potash by decomposing carbonates of these alkalies by means of lime by "causing solutions of the same to be filtered through " slaked lime mixed with some suitable material to give it " porosity, the mixture being placed in proper vessels arranged " for the purpose of filtration," by which are obtained "a much " smaller proportionate quantity of weak solutions of caustic " alkali," and "a more complete abstraction of alkali from the " carbonate of lime produced by the operation" is effected. A series of vats, each having a perforated false bottom, are arranged " in the same manner as a series of vats is ordinarily arranged " for the purpose of lixiviating rough alkali or black ash in the " manufacture of soda by the process well known as continuous " filtration;" "the liquor which has filtered through the contents " of one vat ascends through a pipe from the lower part of such " vat and flows into the next adjoining vat, and so on through " the whole or some part of the series of vats employed." Each ascending pipe is provided with a plug. Also adapting to each vat of the series a pipe extending from the lower part of the same to the level of the upper part, with two branches at its upper part, each with a stop-cock " through which liquor may be conducted " into the same vat again or into another of the same series." Below the false bottom of each vat is a pipe connected with an air pump, by which pressure of air is applied on the surface of the liquor contained in the lower part of the vat, thus elevating the liquor into the upper part of the same vat " or to flow into " another of the series."

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 18.—N° 760.

BROOMAN, Richard Archibald. — (*A communication from Alfred Delaune.*)—" Improvements in the manufacture of barytes " and barytic products, and the application of these substances " in the manufacture of sugar and other uses." Carbonate of barytes is ground, mixed with powdered coal, and calcined from about five to six hours, the mass is cooled out of the air, and lixiviated with water. Here, it is stated, " commence the im- " provements." The solutions of caustic barytes " are first " desulphurized " by hydrated oxides of iron or of zinc, and concentrated in iron vessels until of the greatest density without a deposit, when " they are removed to iron vessels similar to those " used in the manufacture of caustic potash and soda," and reduced " to the state of dissolved hydrate with one equivalent of " water; it is next run into iron pots in blocks easy to carry." This hydrate may be used for numerous purposes, and " in sugar " refineries for precipitating the treacle, and the carbonates may " be returned by the refiners to the manufacturers to reduce." The sulphate of barytes treated with coal and calcined in the same way and lixiviated yields solutions of sulphuret of barium, which " treated by a current of carbonic acid, yield carbonate of " barytes, which is transformed into hydrate " as above. " Sul- " phuret of barium may be used in excess to precipitate sugar; " then the sugar of barytes and the mother waters treated by " carbonic acid will yield carbonate of barytes," which may be treated as above for the hydrate. A part of the sulphuretted hydrogen evolved when burnt yields sulphurous acid, which is combined with " the other part of the sulphuretted hydrogen so " as to form water and sulphur." To transform sulphuret of barium into hydrate of barytes by hydrated oxides of zinc or iron, one equivalent of these oxides or rather more must be used. " The same processes are applicable to strontian."

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 22.—N° 807.

HENRY, Michael.—(*A communication from the Société Coignet Perè et fils et Compaignie.*)—" Improvements in kilns, ovens, and " furnaces." These are, employing in kilns or ovens, for burning lime, &c., " a sole or floor, directly or nearly directly under which

" fire-places are placed, and through which sole or floor numerous " openings are formed for the passage of flames and products of " combustion from the fires into the kiln or oven." Other " outlet holes may sometimes be formed through the sole for the " escape of the gaseous products from the kiln."

Cooling down kilns or ovens by means of "passages or open- " ings with removable doors, plugs, or plates," which "may be " formed in the sides or walls at or just above the sole," the air entering these escapes "through an outlet in the roof fitted with " a removeable cover opened when required."

In another arrangement, "a receiver containing matters to be " subjected to heat is rested on an arch extending over the fire." The hot gases rise from the fire through one or more flues at each corner of the apparatus, and pass into the top of a flue oven or chamber which surrounds the receiver or article to be heated, escaping by other flues opened and closed by valves, &c. The fire-place and ashpit are closed by doors in which are valves, &c.

In another arrangement, "air may be forced into the furnace " above and below the fire-bars." The hot gases are conducted into the upper part of the kiln or oven which contains the materials to be treated. The hot gases in their passage out are regulated by a damper, and "pass through a hopper, feed box, or " receiver containing the charge to be fed into the main charge."

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1862, March 29.—N° 878.

GLASS, William.—(*Provisional protection only.*)—"Improve- " ments in the treatment of sulphuret of antimony, and in " obtaining products therefrom." These are, taking "black " sulphurets of antimony, called antimony ores, or the refined " ore called crude antimony," and placing it or them, "with or " without additional sulphur, in a crucible or other convenient " covered or closed vessel in a furnace," and heating "it or them " to redness in a melted or fluid state," and forcing "upon or " into it or them atmospheric air or oxygen gas, provision being " made in the crucible or other vessel for the ingress of air or " oxygen, and for the egress of the vapourous products of com- " bustion, viz., oxide of antimony and sulphurous acid, which are " conducted into tubes, flues, or chambers, where the oxide of " antimony is condensed as a fine white powder, and the sul-

" phurous acid may be employed as such, or is oxidated or con-
" verted into sulphuric acid by oxygen and steam, as is usually
" practised in vitriol works."

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 29.—Nº 880.

PATERSON, William.—" Improvements in the manufacture
" of iodine." These are, using " the residual still liquor which
" remains in the still after the separation of the iodine has been
" effected in the ordinary way," to " neutralize or decompose, to
" a considerable extent, the sulphur compounds and carbonates
" existing in kelp leys." " The residual still liquor is applied to
" a fresh charge of kelp leys, and in this manner a saving of
" sulphuric acid is effected, and the salts of potash and soda
" which are contained in the residual still liquor are removed.
" The precipitate which is obtained consists of compounds of
" sulphur, manganese, and iron, and occasionally carbonates of
" these metals." " The precipitate, after being washed in water,
" may be employed for the purpose of saturating the free acid
" contained in the 'residual still liquor.' Or, in lieu of this mode
" of operation, the 'residual still liquor' may be evaporated to
" dryness, and applied to the kelp for the purpose of partially
" decomposing the sulphur compounds and carbonates."

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 31.—Nº 887.

MENNONS, Marc Antoine François.—(*A communication from Martial Victor Jouannet.*)—(*Provisional protection only.*)—
" Improvements in the manufacture from vegetable product of
" glucose or fermentable sugar." These are, first, " the applica-
" tion of the 'carob beans,' or fruit of the carob tree ('ceratonia
" 'siliqua,' L.), to the production " of the above, " adapted to a
" variety of manufacturing purposes," which are named, among
which are vinegars.

Second. " The processes by the aid of which this substance is
" extracted from the raw material," are as follows :—The fruit is
reduced by graters or other appropriate mechanism, and digested
for 24 hours at " 60° centegrade (140° F.) in water five times the
" weight of the mass, and hydrochloric acid one thousandth part
" in weight of the water employed ;" the acid is then neutralized

by " an alkaline carbonate (carbonate of soda, potash, or lime, for " instance)," and the whole filtered, and the insoluble matter and precipitate containing " nitrogenized elements " collected may be utilized for the nourishment of cattle, &c. The filtered liquid is clarified and concentrated " in the ordinary way."

[Printed, 4*d*. No Drawings.]

A.D. 1862, April 2.—N° 936.

CLARK, William.—(*A communication from Louis Joseph Frédéric Margueritte and Aifred Lalouël de Sourdeval.*)—(*Provisional protection only.*)—" Improvements in the manufacture of carbonic " acid." These are, " two parts of filings and one of copper " turnings " are roasted at " a deep red heat on the sole of a cast- " iron retort, open at both extremities." Under the action of the current of air the copper rapidly oxidises; when the whole of the copper is converted into the black oxide of copper, it is allowed to cool, and mixed intimately with " about six per cent. in weight of " finely pulverized charcoal," and the mixture placed in a retort and heated disengages carbonic acid, " until the whole of the " charcoal of the mixture has been consumed by the oxide of " copper." " When the operation is over, the retort is opened at " both ends," and the copper becomes reoxidated or revivified, and removed from the retort is cooled and mixed with charcoal, as before, and the mixture distilled. " The copper should be " washed from time to time with plenty of water, in order to " remove the carbonates and salts resulting from the combustion " of the charcoal." If after a number of times the copper begins " to fritter and work badly, it may be melted in a crucible and " mixed with fresh filings and turnings as above described." The gas " produced is perfectly pure, and may be employed for the " manufacture of gaseous waters," &c., and " the preparation of " carbonates of soda, ammonia, white lead, and other purposes." Substituting " any other metallic oxides capable of reduction in " charcoal and oxidisable in air, such as oxides of iron or man- " ganese." The mixture of charcoal and metallic oxide is calcined, and the gas " passed through a second retort, filled either " with the oxide in question, or with oxide of copper."

[Printed, 4*d*. No Drawings.]

A.D. 1862, April 10.—Nº 1030.

DEACON, Henry.—"Improvements in the manufacture of " caustic soda." These are, first, "obtaining crystals of caustic " soda containing more than one atom of water by cooling caustic " soda liquors " as follows:—Stopping the "evaporation at an " earlier stage, removing the salts precipitated during evapora- " tion as usual, and continuing the evaporation or concentration " until the caustic alkaline liquor will deposit crystals of hydrated " caustic soda on cooling to the ordinary atmospheric tempera- " ture." "The mother liquors separated from these crystals may " be used for subsequent operations, or are finished alone."

Second, "removing the last portions of mother liquors from " caustic soda crystals by means of an elevated temperature below " but approaching to their melting point." The crystallizing vessel is "provided with a steam casing or other means of " applying heat, so that its contents may be heated to complete " the drainage of the mother liquors from the crystals," and in preference "increasing the temperature of the crystals to about " one hundred and forty degrees." When "the crystals are well " drained the heat may be increased until they are melted, and " they can then be run into suitable packages for sale, or be con- " centrated by the application of stronger heat."

[Printed, 4*d*. No Drawings.]

A.D. 1862, April 17.—Nº 1115.

ABEL, Charles Denton. — (*A communication from Louis Alexandre Taillandier.*) — (*Provisional protection only.*) — " Im- " provements in the manufacture and production of the chro- " mates and the bichromates of potash and of soda." These are, " substituting sulphate of potash and sulphate of soda for the " carbonates and nitrates of these bases, as employed at present " in the manufacture respectively of the bichromate of potash " and of the bichromate of soda," as follows:—Chrome iron ore, reduced to the finest powder, is "mixed with sulphate of potash " and with caustic lime or carbonate of lime in proportions " varying according to the proportion of oxide of chromium " contained in the ore," and the mixture thrown on the bed of a reverberatory furnace in a thin layer and "maintained at a red

" heat, suitable apertures and arrangements being provided in " the furnace, so that a highly oxydizing effect may be produced " on the mixture." The sulphuric acid goes to the lime forming sulphate of lime, and " the potash thus liberated combines with " the chromic acid (which is formed by the oxydation produced " under the influence of the excess of lime employed and the " presence of atmospheric air) to form chromate of potash." When this operation is completed the mass is withdrawn from the furnace and the soluble chromates are dissolved in water, the solution concentrated, and a sufficient amount of sulphuric acid added to combine with one half of the potash of the neutral chromate in solution, and the whole heated and crystallized. The bichromate will crystallize out from the sulphate which is to be re-used. In the manufacture of bichromate of soda substituting sulphate of soda for sulphate of potash.

[Printed, 4*d*. No Drawings.]

A.D. 1862, April 17.—N° 1118.

HUTCHINSON, WILLIAM HODGSON.—(*Provisional protection only.*)—" Improvements in the manufacture of ammonia or its " salts and cyanogen and its compounds from refuse gluten." These are, first, subjecting " the refuse gluten from starch and " other manufactories " to " destructive distillation in iron, clay, " or other suitable retorts, and the gaseous products are condensed " or collected in any suitable manner." " From these products " the pure ammonia is obtained by filtering and redistillation, or " is crystallized by the addition of acids."

Second, obtaining " the compounds of cyanogen either by fusing " the refuse gluten in a retort with potash, soda, lime, or other " salts, or by passing the gaseous products from the first retort " over red-hot charcoal soaked beforehand in a solution of the " required salt or salts."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 3.—N° 1317.

HENRY, MICHAEL. — (*A communication from Jean Baptiste Vasseur and Xavier Lamotte.*)—(*Provisional protection only.*)— " Improvements in the process of and apparatus for preparing " materials for the manufacture of paper, and in obtaining " products from agents used in the said process, part of the

" invention being also applicable to apparatus for washing." These are, in reference to this subject, in disintegrating plants and other vegetable materials by boiling them or "subjecting " them to heat or steam, and at the same time treating them with " alkaline solutions or other agents " in thin layers or strata. To the lyes or alkaline solutions, after treating the vegetable matters, " a small quantity of sulphuric or other acid is added, and a " matter is obtained from the filter suitable for manufacturing " picric acid or a like acid by means of nitric acid." " On treating " it like heavy oils distilled from coal with nitric acid the liquor " that has passed through the filter holds in solution an alkaline " salt, of which the acid is to be saturated with a carbonate, and " it is again brought to a caustic condition by adding to it an " alkaline salt, and the whole then treated with lime to obtain a " caustic lye, and precipitate the carbonates, sulphates, and other " matters which are formed; also the used filtered lyes may be " left to cool or evaporate in the air or sun to collect and obtain therefrom their alkaline salts."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 6.—Nº 1347.

CHENAILLIER, PAUL. — " Improvements in apparatus for " concentrating liquids, or for condensing alcoholic or other " vapours." These are, in apparatus for concentrating saccharine, alkaline, acid, or other liquids, and consists " of a series of " hollow discs of thin copper or other suitable sheet metal fixed " vertically and parallel to each other," on " a hollow arbor " situated in a slightly slanting position and turning in suitable " bearings above a trough containing the liquid to be concentrated, whilst steam or other suitable heating medium is allowed " to enter at one end of the arbor and circulate in the discs, " which latter dip and revolve with part of their surface in the " liquid; the opposite end of the arbor is bent into a syphon " form, and is partly filled with water. If required, the apparatus may be contained in a vessel in which a more or less perfect " vacuum may be established, and a series of tubes may be connected in a tangential manner to the periphery of the discs, so " as to allow of the steam or other heating medium to circulate " also in those tubes." " Provision is made for causing the water " resulting from the condensation of the steam in the discs to " be discharged from the apparatus." " If the apparatus is to

" serve for condensing alcoholic or other condensible vapours," these latter are conveyed into the lentils or discs, "which latter " are in that case partly immersed in any suitable cooling or " refrigerating medium contained in the trough."

[Printed, 8*d*. Drawing.]

A.D. 1862, May 6.—N° 1350.

JOHNSON, John Henry.—(*A communication from Charles Louis Pierre Burton.*)—" Improvements in the manufacture and " production of minium or red lead." These are, converting " of oxide of lead when free or uncombined, and of certain basic " salts of lead, into minium or red lead, by mixing the same with " either nitrate of potash or soda, and with either carbonate of " potash or of soda, or of mixtures of the same, and subjecting " such mixtures to the action of an elevated temperature, whereby " the oxide of lead is oxidised, and is converted into minium or " red lead." As an example, "1 equivalent of purified and dried " sulphate of lead, or 1·894 parts by weight; 1 equivalent of carbonate of soda, or 0·665 parts by weight; and 1 equivalent of " nitrate of soda, or 0·143 parts by weight," are mixed together and " heated to a dull red heat in presence of an excess of nitre," forms "a mass of a beautiful red vermillion colour," which is lixiviated with water to wash out the " soluble salts (sulphates, " nitrates, and nitrites)." The residue, red lead, is drained and dried.

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 6.—N° 1352.

JOHNSON, John Henry.—(*A communication from Charles Louis Pierre Burton.*)—" Improvements in the manufacture of " soda and potash, and of their carbonates." These are said to be, first, the production of these substances from their sulphates or their sulphides as follows:—Sulphate of soda is mixed " with " about thirty-five per cent. by weight of powdered charcoal, or " its equivalent of coal," &c., and this mixture subjected " to a " red heat, either in closed vessels or in a reverberatory furnace, " under the influence of a reducing flame," " so long as carbonic " oxide is disengaged." The residue is cooled out of the air, lixiviated with water, and the concentrated solutions of sulphide of sodium are boiled " for about thirty minutes with some de-

" sulphurising agent, which shall combine with and render " insoluble all the sulphur composing the sulphuret," " having in " solution caustic soda in a pure state." " The sulphuretted " compound produced " is washed, dried, decomposed by heat, and the sulphurous acid conveyed into " a leaden chamber for " the manufacture of sulphuric acid." This property of desulphurising is possessed by certain metallic oxides, carbonates, or hydrates, " under a greater or less pressure." The oxide of iron is named, but the oxide of copper is preferred. Sulphate of potash may replace the sulphate of soda above, when twenty-eight per cent. of charcoal should be used.

Second. " The mode of preparing the oxide of copper in a state " of division for decomposing the alkaline sulphides " " by de- " composing one equivalent of sulphate of copper, obtained by " roasting copper pyrites, with one equivalent of nitrate of soda " or potash," " utilizing the nitrous acid of the decomposition of " nitrate of soda." No mention is made of this in the Provisional Specification. Metallic oxides are made by heating equivalent quantities of the sulphide of the metal and of the nitrate, utilizing the nitrous fumes.

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 8.—N° 1385.

DE LA PEYROUSE, Leo.—" Improvements in treating neu- " tral and acid fatty or oily substances, resins, and resinous sub- " stances, and compounds or products containing paraffine." These are, treating those " substances and products with azoto-sul- " phuric acid ($AzO_3, 2SO_3$), and with the products resulting from " its decomposition by water or organic substances," as follows :— " Azotosulphuric acid may be obtained by passing nitrous acid " into, or by mixing the same with, sulphuric acid, or it may be " obtained by the direct combination of azotous or nitrous acid " and sulphurous acid, or of hypoazotic acid and sulphuric acid, " or by any other means." Also, " subjecting the substances " before mentioned to the action of a salt or compound of nitric " acid, such as nitrate of soda, or any other suitable nitrate in " conjunction with sulphuric or any other suitable acid, with the " addition of a reducing substance or agent, such as treacle, saw- " dust, starch, or any other reducing agent, so that when these " substances re-act upon each other the nitric acid may be re-

" duced, and the desired compound of nitrogen may be produced." Also, " subjecting the substances and products " to " the action " of a nitrite, such as nitrite of soda, or any other nitrite, in con- " junction with an acid, such as sulphuric acid." After the substances have been treated in any way above described, " they are " to be washed with water, so as to remove any acids, salts, or " other impurities remaining."

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 15.—N° 1475.

BAGGS, Isham, and SIMPSON, William.—" Improvements " in treating straw, Spanish grass, and other vegetable fibres, in " preparing a bleaching agent for vegetable fibres, and in recover- " ing and treating an alkali resulting from the treatment of the " said fibres, and in apparatus employed therein." These are, in reference to this subject, first, " recovering the alkali, or a portion " thereof, employed in the treatment of vegetable fibres," as follows :—The alkaline liquor is caused " to trickle in showers " through roses or perforated pipes upon heated metal tubes," which it is preferred to place horizontally. These " tubes are " united by pipes common to the whole of the tubes or otherwise, " in order that the heating medium, steam, air, or water, may " pass through a series of several tubes." " The solid matter " deposited and accumulated on the tubes is scraped off and dis- " tilled in retorts, the gas evolved is collected for illuminating " purposes." The residue " in the retorts is caustic alkali, which " may be used again." Instead of the above tubes, " heated " cellular plates or slabs may be employed."

Second. Preparing " chlorine, the bleaching agent for vegetable " fibres," and " the construction and employment of retorts " for same, as follows :—Two separate vessels are used, in the first is the chloride of sodium, in the second is the black oxide of manganese and water. The muriatic acid gas is led from the first into the second vessel, the gas is absorbed, and heat is generated, which heat causes the muriatic acid to decompose," and chlorine is evolved, and is " conducted into a chamber con- " taining slaked lime, as in the preparation of chloride of lime, " or it may be conducted into a cistern containing a mixture of " fresh lime and water," kept well stirred. Employing an exhauster to this apparatus.

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 17.—N° 1496.

BINKS, Christopher.—(*Provisional protection only.*)—" Improved methods of obtaining oxygen and chlorine gases." These are, first, causing " a mixture of hydrochloric acid gas and " oxygen gas, or a mixture of hydrochloric acid gas and atmospheric air, or atmospheric air," to which has been added oxygen gas, in preference in a dry state, " to be brought into contact " with concentrated or strong sulphuric acid, either under ordinary temperatures, or under temperatures higher than ordinary " ones, in order to effect the decomposition of the hydrochloric " acid, with the liberation of its chlorine in the form of gas."

Second. Projecting " strongly heated oxygen gas, or atmospheric air, or a mixture thereof," into liquid hydrochloric acid, " in order to effect the decomposition of the acid, and liberation " from it of gaseous chlorine."

Third. Causing strongly heated oxygen or air, or mixture thereof, to be brought into contact with an excess of hydrochloric acid at ordinary temperatures, in the first instance for the " liberation of the chlorine in the form of gas." Pipes convey away the water and excess of hydrochloric acid. Substances to combine with the hydrochloric acid gas may be employed.

Fourth. Bringing into contact with water or steam strongly heated chlorine; oxygen gas is liberated, and hydrochloric acid is formed. " Substances capable of absorbing or combining with " the hydrochloric acid formed," are added.

Fifth. Applying heated dry chlorine to the manganese, or other oxides, at ordinary temperatures or otherwise; a chloride of the metal is formed, and the previously combined oxygen is liberated in the form of gas. The chloride of manganese may be applied to useful purposes, or treated for its recovery as described in No. 1240, 1860.

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 20.—N° 1528.

PETRIE, William.—" Improvements in vessels for boiling " chemical products, as sulphuric acid, and in apparatus for " indicating the degree of concentration and temperature of such " products in the boiler, which apparatus is applicable to other " pyrometric purposes." These are, first, " the means of outflow " for the boiling liquor, namely, an open shaped vessel fixed

" within the boiler and having its rim at a level suitable to receive " the foam as it rises from the liquor, so that the foam shall settle " therein and pass out in a liquid state by a syphon, or through a " tube attached to the vessel, so as to trap the vapor within the " boiler, while the liquid flows out through the tube."

Second. "The general construction of the vessel for boiling " chemical products." The vessel, still-shaped in preference, is made of an "alloy of platinum and iridium." The bottom, horizontal and flat, rests on a corresponding flat horizontal ring, preferably of cast iron. The fire is underneath, the inflow of liquid is regulated by a single cock, the outflow is described above.

Third. "Deadening, frosting, or roughening the heating surface " of such vessels externally." The surfaces "are platinized by " galvanic battery to increase their absorption of heat, while the " other surfaces are well polished to make them retain their heat."

Fourth. "The particular construction of the pyrometic apparatus," for "indicating the degree of concentration of the liquid " according to its temperature of ebullition." This consists essentially of a helix made of "laminæ of metals which expand " differently by heat, the laminæ being united face to face, and " coiled into a helix in such a manner that it partly twists and " untwists according to the changes of temperature." This is inserted in a hole in the upper part of the boiler.

[Printed, 8*d*. Drawing.]

A.D. 1862, May 26.—N° 1564.

LIVESEY, George Thomas.—(*Provisional protection only.*)— " Improvements in purifying illuminating gas, and in treating " the products obtained in the various processes of purification." These are, in reference to this subject, first, causing "a solution " of sulphurous acid" to pass down "through an ordinary " 'scrubber' filled with coke or other suitable material," the impure gas passing upwards. The ammonia forms with the sulphurous acid sulphate of ammonia, which is carried into a tank at the bottom of the scrubber; a portion of the sulphuretted hydrogen is also decomposed, and the sulphur precipitated and collected in the tank or otherwise. The gas is washed with water in a second scrubber, so as to cause any sulphurous acid that may pass over with the gas to decompose any remaining sulphuretted hydrogen. The resulting solution may be conducted into the vessel containing the solution of the first scrubber or otherwise. The gas is further treated to purify it.

Second. Converting the products obtained above, as follows:— The sulphur precipitated is collected, and "washed and dried to "be fit for the market." The solution of sulphite of ammonia, formed as above, "is first rendered of sufficient strength, by "using it over and over again in the scrubbers, adding each time "fresh sulphurous acid to combine with more ammonia." When is sufficiently strong it is exposed to the atmosphere to absorb oxygen, so as to convert it into sulphate of ammonia. The crude ammoniacal liquor condensed is converted by admixture with sulphurous acid into sulphite of ammonia, which is then converted into sulphate, as above described.

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 28.—N° 1608. (* *)

BLACKMORE, William, and LAMB, Henry.—"This invention has for its object improvements in burning limestone and "generating steam. For these purposes, in order more advan-"tageously and economically to burn the fuel used, whether coal, "turf, or peat, when generating steam, limestone is introduced "into and burned in ordinary steam boiler furnaces, by which "lime is manufactured at a cheap rate, whilst the fuel employed "is found to be more effective in generating steam than when "burned in the same furnaces without the introduction of lime-"stone."

[Printed, 4*d*. No Drawings.]

A.D. 1862, June 11.—N° 1743.

GERLAND, Balthasar Wilhelm.—"Improvements in the "manufacture of sulphate of copper, and in obtaining metals "from the material used in such manufacture." These are, the hydrochloric acid solution of copper ores is evaporated, and when nearly all the water is driven off, "a quantity of sulphuric acid "is added to the charge in the furnace, sufficient to convert the "copper into sulphate of copper." Hydrochloric acid is driven off and mixed with a little steam, and condensed in a flue with a down-flow of water; this solution is to be "used for extracting "fresh quantities of ore." The materials in the furnace are calcined, with stirring, "until the greater part of the iron salts is

" decomposed and converted into the red oxide." "The calcined " material is then treated with hot water, in such quantity as to " produce a concentrated solution of all soluble substances, " which are separated from the insoluble matter by filtration or " decantation." The silver is in the residue, and is extracted by " smelting," or " by solvents in aqueous solutions, in which case, " the remaining oxide of iron can be used." "The liquors " separated from the oxide of iron contain iron in solution, which " has to be rendered insoluble;" this is effected by adding oxide or carbonate of copper or malachite, having first peroxidized the iron by means of chlorine or a hypochloride. The sulphate of copper is obtained from the liquor by crystallizations. The mother liquors from the last crystallization contain all the nickel and cobalt, and which are obtained " by methods already in use." The precipitate by oxide or carbonate of copper contains uranium, which " can be separated by methods well known."

[Printed, 4*d*. No Drawings.]

A.D. 1862, June 14.—N° 1774.

BROOMAN, Richard Archibald.—(*A communication from Charles Claude Philibert Nicolas Pernolet.*)—" Improvements in " coking ovens, in collecting and utilizing the products resulting " from the distillation or carbonization of coal and other matters " producing coke, and in apparatus employed therein." These are, in reference to this subject, the method of condensing such products as are capable of being liquified, and preserving each of such products as follows:—The gaseous product is made to traverse through compartments " formed of thin metallic plates, " smooth and close to one another, by coming in contact with " which it becomes gradually cooled." The cooling is accelerated by a continuous flow of water falling from reservoirs into the chambers " from whence the water spreads on each side so as " to run down externally from top to bottom the whole extent of " the sides of the condenser." A light wood casing surmounts the condenser. At the bottom of the condenser are two troughs where the greater portion of the ammoniacal waters deposit along with the tar; the gases and ammoniacal vapours enter into the first washer, which they traverse from bottom upwards through fine showers of ammoniacal water supplied continually by a pump and reservoir. "The ammoniacal waters are thus enriched to any

" desired degree for being afterwards advantageously treated." The current of gas thus purified " passes to the second washer, " similar to the first, but supplied with water only, to complete " the absorption of the ammoniacal waters."

[Printed, 1s. Drawing.]

A.D. 1862, June 20.—Nº 1825.

WARNER, Arthur.—" Improvements in the manufacture of " pigments or paints from certain refuse materials." These are, " the application of refuse or slag obtained from puddling and " reheating or other furnaces employed in the manufacture of " malleable iron to the manufacrure of pigments or paints " as follows:—The above materials are ground " to a fine or " impalpable powder," in preference by " apparatus such as is " employed for grinding flints for pottery purposes, the materials " being ground in water. After being sufficiently ground, the " materials are run off into a tank and allowed to subside, and " then the water is run off from the surface and the wet slimy " mass is spread upon heated flues, or the material may be " dried by any convenient means." " The pigment or substance " thus prepared must then be taken up and made into paint by " mixing with water or oil," &c.

[Printed, 4d. No Drawings.]

A.D. 1862, June 27.—Nº 1883.

COCHRANE, Charles.—" Improvements in the manufacture " of aluminate of soda and potash." These are, slags from the iron blast furnace are " reduced to a powdery form by any of the " well known methods, the best being first to run the slag whilst " in a molten state direct into water, to dry the friable slag thus obtained, and to crush it " between a pair of cylinder rollers." The powdered material is now mixed with, in preference, one part of the dry carbonate of soda or potash to four parts by weight of slag, containing about 23 per cent. of alumina, and the mixture is heated in a reverberatory furnace " somewhat " above a 'cherry red' heat, but falling short of actual fusion," until a portion withdrawn from the furnace ceases to effervesce on adding an acid, by preference hydrochloric acid. The materials are then withdrawn and lixiviated with water, and the solution evaporated, and " the aluminate of soda or potash

" obtained therefrom." " Artificial slag, produced by fusion of " a mixture of clay and lime, or limestone, or chalk, may be " employed, the mixture being made in such proportions that " for every equivalent of silica in the clay two equivalents or " thereabouts of lime shall be present in the compound."

[Printed, 4*d*. No Drawings.]

A.D. 1862, June 27.—N° 1891.

CROLL, ALEXANDER ANGUS.—" Improvements in the treat- " ment of ammoniacal liquor of gas works." These are, " steam " from a suitable boiler is conveyed into ammoniacal liquor con- " tained in a suitable closed chamber, and the combined vapour " and steam resulting are conveyed from the upper part of this " chamber into other ammoniacal liquor contained in another " closed chamber placed somewhat higher than the preceding, " in order that as the ammoniacal liquor in the previous chamber " becomes spent, it may be supplied from the second; and if " desired, other number of such ammoniacal chambers may be " employed. From the last ammoniacal chamber the vapour " resulting, combined with particles of steam, are conveyed into a " closed compartment or chamber of a vessel containing acid " adapted to the salt of ammonia desired to be obtained," and " it is at its upper part divided into two compartments, one open " at the top, the other closed by a cover, and a partition dipping " below the surface of the acid liquid therein, and below the " mouth of the pipe, conveying the vapour and steam thereto " from the last ammoniacal chamber. Any vapour arising from " the closed compartment of this vessel is conveyed into similar " acid in another closed chamber used as a reservoir. From the " upper part of this last closed chamber the sulphuretted " hydrogen liberated is conveyed to the furnace, supplying a " vitriol chamber."

[Printed, 4*d*. No Drawings.]

A.D. 1862, July 5.—N° 1953.

WARNER, ARTHUR.—" Improvements in preparing materials " for and in purifying coal gas." These are, employing " the " cinders or oxide of iron obtained from puddling, re-heating, " and refining furnaces used in the manufacture of iron," prepared as follows :—By first grinding or stamping and sifting them

" through sieves with holes, by preference of about one-eighth to " one-sixth of an inch square;" if they contain much dirt or impurities "it is desirable that the same should be washed out " before the cinders are used." "The sifted oxide is used in what " are called dry lime purifiers or those wherein other oxides of iron " are used, and in like manner thereto, and such cinder or oxide " is generally used in a damped state, but this is not essential." The above prepared material when "used for the first time to " purify coal gas, the sulphuretted hydrogen is not so fully and " effectually acted on as when using hydrated oxide of iron, as is " now very largely employed," and it is only when this material has been farther prepared that it fully and effectually acts on it; " hence it is desirable when using a quantity of such cinder or " oxide for the first time to combine it with a quantity of other " like cinder or oxide which has been before used, and has been " subsequently prepared by the action of atmospheric air." After the material has been used, until it has not sufficient power for " purifying gas, it is "removed from the purifiers and made up " into heaps in the open air till the same becomes heated, when " the cinder or oxide is to be spread and turned over from time " to time till it becomes again suitable for use, which will generally " be the case in a few days, depending upon the state of the " atmosphere." The materials, "thus prepared, not only retain " the property of removing carbonic acid and ammonia which " they are found to possess when used in the first instance, but " they are rendered more effective in removing also the sulphuretted " hydrogen from coal gas."

[Printed, 4*d*. No Drawings.]

A.D. 1862, July 9.—N° 1977.

ESCHWEGE, HERMANN.—"Improvements in purifying wood " and other vinegar." These are, taking crude pyroligneous or acetic acid and, in preference, first expelling the naphtha by distillation, and then diluting it with from "three or four times and more, " if necessary, its bulk of water" (and have it, in preference, " well cleared of its tarry matters)" and filtering it through a succession of charcoal (by preference of wood) filters, "or neutraliz- " ing the crude acid (by preference with lime or soda)," and *filtering* "a diluted mixture thereof containing from 10 to 20 °/$_0$ of " *neutralized* acid or acetate through a succession of charcoal

" filters composed, by preference, of animal charcoal." Neutralized wood acid or dry acetate is dissolved and purified in the same manner. In preference, using "a series of fifteen filters," and " the top of each filter of the series is, when at work, connected " with the bottom of the filter which is for the time the next to it " in the series; and the connections of the filters are to be so ar- " ranged, that when any of the series has been for a time the " last in the series, and the diluted vinegar is found to be coming " off less pure," "it may become the last but one filter in the " series by being coupled to a clean filter."

[Printed, 4*d*. No Drawings.]

A.D. 1862, July 17.—N° 2044.

DICKSON, JAMES.—" Improvements in the manufacture of " caustic soda and carbonate of soda." These are, in reference to this subject, first, "employing heated aqueous solution of " certain salts alluded to" in "the Provisional Specification." The most preferable are common salt from any source, kelp, crude nitrate of soda, "carbonate of soda contaminated with chloride " of ammonium, as when common salt is decomposed by Dyer " & Hemming's process for producing carbonate of soda." " Monosulphide or bisulphide of sodium, or the solution of " sodium" from heating to bright redness, sulphate or sulphite of soda with coal dust, and lixiviating with water; also the impure black ash and other soda liquors in a battery cell, which may be of cast iron, and in which a porous cell is placed, in which is a carbon anode with a metallic conductor; a metallic conductor is connected with the cast iron cell, at the bottom of which is a tap "to draw off the soda liquor formed by battery action." If chlorine is evolved, a cover of glazed earthenware is fitted to the decomposition cell. This decomposition cell is heated. A series of charged battery cells is connected with this decomposition cell. The soda liquor, when of the required gravity, is drawn off into a boiler, evaporated by boiling, exposed in chambers to carbonic acid gas, or in its fused state is run into moulds. The carbonate of soda solution is evaporated to crystallization. During the battery action, by keeping the temperature of the chloride solution at about 150° Fahrenheit, " the chlorine " is absorbed in the fluid of the said porous cell;" the fluid " may, when syphoned into proper vessels, be heated, and the " chlorine expelled therefrom as gas, to be used as desired."

Instead of a carbon anode in the porous cell, wrought or cast iron, zinc, lead, copper, may be substituted under certain circumstances. When iodides and bromides are present in the decomposition cell, sulphuretted hydrogen or sulphurous acid gases are passed into the positive compartment from the beginning of the action; the iodine and bromine are "ultimately determined to " the fluid of the positive compartment of the said decomposi- " tion cell, as hydriodic and hydrobromic acids," which may be extracted by the usual chemical re-gents, or by arresting the supply of the above acid gases, and continuing the said battery, iodine and bromine are "evolved as vapour and condensed in " suitable receivers." In place of sulphuretted hydrogen or sulphurous acid, "soluble sulphite or hyposulphite of soda may " be used in the said positive compartment." When the sulphides named above are subjected to the battery treatment and exposed, a large portion of the sulphur crystallizes out, and by exposing it to carbonic acid, carbonate of soda and sulphur result. "The " whole of the sulphur and sulphuretted hydrogen formed is " collected, burned, and converted into sulphuric acid to be used " in any or some of the battery cells, the nitrous fumes necessary " being obtained from battery action."

Second. "When carbonate of soda is contaminated with chlo- " ride of ammonium," a solution of the mixture is transferred into the negative compartment, and a solution of common salt into the positive compartment, and the decomposition cell heated to 212° F., or gently boiled by applying the battery, and continuing its action "the ammonia escapes" by a "pipe from the de- " composition cell," and conveyed with carbonic acid gas into a chamber, "it may be absorbed as sesqui or bicarbonate of am- " monia in cold water." During "the battery action, oxide or " deoxide of copper may be added to the said ammonia fluid of " the said negative compartment." In any of the above cases, " by adding acetic or pyroligneous acid to the negative compart- " ment of the said decomposition cell" until the solution is acid, and continuing the battery action, acetate of soda is the result, and the solution evaporated, and the salt "heated to a dull red " heat to form carbonate of soda," and "the acetic vapours again " absorbed and used as already explained." To the acetic acid in the decomposition cell a portion of common salt is added, "with " the oxides of either lead or copper, or other suitable oxides," and the acetate of soda, formed as above described, is crystallized from the impurities, and " converted as described into carbonate

" of soda." " Instead of using acetic acid as described, sulphu-" rous is substituted for it," and the sulphite of soda obtained is " converted into carbonate of soda by the ordinary method of " manufacturing the said carbonate."

" Chloride of potassium may be similarly decomposed, and its " chlorine and potassa utilized as described with reference to the " said decomposition of common salt; but in this case a decom-" position cell, in which soda is eliminated from common salt, is " to be included in the series of battery and decomposition cells " used." " The same method is put in force when nitrate of soda " or of potassa is subjected to battery action, a carbon or copper " anode being used in the decomposition cell." Modifications of employing voltaic electricity for obtaining caustic soda and carbonate of soda are described.

In manufacturing " carbonate of soda from the exhausted oil " of vitriol from the battery cells, hydrochloric acid is driven off, " and is to be condensed in towers," in which is peroxide of iron, so as to form perchloride of iron used in some battery cells as a " negative electrolyte," the " positive electrolyte " being either soda waste or sulphide of sodium.

[Printed, 1s. 4d. Drawing.]

A.D. 1862, July 18.—N° 2050.

GOSSAGE, William.—" An improved method of and apparatus " for decomposing chloride of sodium and chloride of potassium for " the production of compounds of soda and potassa." This consists, first, in decomposing " chlorides of sodium and potassium for " the production of certain compounds of soda or of potassa," " by causing such chlorides or one of them when in the state of " vapor mixed with the vapour of water, and mixed with gaseous " products of the combustion of fuel, to be brought into contact at " an intense heat with lumps or pieces of certain solid substances " in " such manner as to provide for such mixture of vapours and " gaseous bodies filtering or flowing through interstices existing " between the said lumps or pieces of solid substances." The substances which are employed as " decomposing substances " are " those which either contain silica or alumina or contain both " silica and alumina." When using silica employing " the nodules " of flint, such as occur in the chalk strata." Silicate of soda is formed and hydrochloric acid is evolved and condensed. The silicate of soda may be dissolved, and the solution treated with caustic lime, caustic soda is in solution, and "may be concentrated " so as to yield solid caustic soda." To obtain carbonate of soda, the solution of silicate of soda is treated with carbonic acid gas, silica is precipitated, and carbonate of soda is in solution and may be crystallized or dried; chloride of potassium is treated in the same manner. When alumina is used as the "decomposing substance" aluminate of soda or of potash are produced useful for sundry purposes, and by treating such aluminates in the same manner as the silicates, obtaining the hydrate and carbonate of the alkalies. When a material is used "containing silica and alumina as a " decomposing substance" a mixture of the silicate and aluminate of the base is obtained, which is treated similarly to the silicate for the hydrate or silicate of the base. For "decomposing substances" besides the nodules of flint, "clay slate" is a natural substance, as also "felspar and granite;" when "so used the soda or potassa " previously existing in such substances is obtained in the mixed " silicate and aluminate produced." "The precipitated silica " or alumina, or mixed precipitates of silicate and alumina ob" tained" above may be made into lumps "by drying and com" pression, or by other means, and then become suitable to be " used as 'decomposing substances.'"

Second. "The construction of apparatus which provides for " chloride of sodium or chloride of potassium in the state of " vapour mixed with the vapour of water, and mixed with the " gaseous products of the combustion of fuel, being caused to " filter or flow at an intense heat through interstices existing be" tween lumps and pieces of certain solid substances (herein-before " defined) contained in a tower of (or) chamber." This tower is "of fire-bricks or other suitable refractory material bound to" gether and supported by plates or bars of iron applied exter" nally." In connection with each tower or chamber is a furnace or furnaces, the gases and heat from which are made to pass over the salt to be vaporized, and to carry it in a state of vapour into the top of the tower along with steam and air injected at the same time.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1862, July 19.—N° 2061.

BROOMAN, Richard Archibald.—(*A communication from Absalon Hyppolyte* Leplay *and* Jules François Joseph *Cuisinier.*)—

" Improvements in revivifying animal black, in apparatus em
" ployed therein, and in recovering a product employed in the
" revivification." These are, first, " revivifying animal black by
" means of caustic soda solutions and washings."

Second. The apparatus for effecting the same.

Third. " Recovering the soda employed in the process."

The animal black spent is treated " in a series of revivifying
" cylinders, by preference four in number." Each cylinder contains a perforated false bottom, for permitting the inlet of steam from a steam supply pipe ; each cylinder communicates with that next to it by a pipe extending from beneath the perforated false bottom of one to the upper part of the next. There is also a pipe leading directly from the upper part of the first cylinder to the lower part of the last in the series. The animal black before placing in the cylinders is washed with hot water, steam is admitted through the perforated false bottom in the first cylinder, and boiling caustic soda solution at the top of the cylinder ; the steam meeting the solution of boiling caustic soda " causes a bubbling and agitating
" action and a general motion of all the particles of black ; the
" caustic soda solution being continued to be added, passes into the
" second, third, and finally into the last cylinder in the series.
" When the action has been continued long enough in the first
" cylinder the admission of caustic soda is prevented and commu-
" nication closed to the next cylinder ; hot water is now admitted,
" then hydrochloric acid, after which a solution of biphos-
" phate of lime, then water to wash the black. The black is
" now completely revivified, is withdrawn and dried. The like
" process is continued in all the other cylinders, and finally the
" caustic soda is made to deposit in the last cylinder in the
" series."

The solution of caustic soda charged with coloring matter which has been received into a reservoir is evaporated, and when thick subjected to the heat of a furnace ; when pasty an oxidizing agent is added, using " nitrate of soda by preference because it is cheap
" and in no way effects the soda." "The nitrate of soda must be
" added in small quantities, allowing time for its action between
" each addition," stirring the mass well until "all the organic
" matters extracted from the black by the soda " are destroyed, when the process is complete.

[Printed, 1*s*. Drawing.]

A.D. 1862, July 21.—Nº 2073.

FELL, Alexander Morrison.—(*Provisional protection only.*) " Improvements in obtaining or manufacturing sulphate of am-" monia and manure." These are, " using matters arising in the " distillation of oil from bituminous schales or schists." The " ammoniacal liquor or water," " after separation from the oil, is " put into a convenient vessel, and has sulphuric acid added to it " until it is ascertained by the ordinary tests that all the am-" monia has combined with the sulphur [sulphuric acid?]." The resulting liquid evaporated to dryness, " the dry residuum being " sulphate of ammonia."

[Printed, 4*d*. No Drawings.]

A.D. 1862, July 24.—Nº 2101.

DICKSON, James.—" Improvements in treating copper ores and " solutions of copper to obtain copper therefrom." These are, in reference to this subject, first, when the sulphates of soda and potash are formed in the preparation of green chloride of copper by adding a hot saturated solution of sulphate of copper to a hot solution of common salt until the whole is converted into sulphate of soda and chloride of copper, " the said sulphates are to be con-" verted into their respective monosulphides, which latter are to " be used as positive electrolytes, with carbon as positive pole, in " farther assisting by voltaic agency the precipitation of metallic " copper from the said brown aqueous solution of dichloride of " copper in common salt." Instead of crystallizing out the sulphate of soda first from the green chloride, the sulphate may be obtained after the total extraction of the metallic copper from the above brown solution.

Second. A solution of copper is obtained from its ores after roasting them if required, and in fine powder, by adding them to a solution of common salt, in which is dissolved sulphurous acid prepared by burning sulphur in excess of air, " with constant " agitation with access of air," until the whole or greater portion " of the cupreous substances added are dissolved or converted into " white dichloride of copper; a sulphur salt of soda, probably sul-" phite of soda, is at the same time formed." The materials may be heated during the reactions above, and their solution is to be used as negative electrolyte at about 212° F., with either iron, &c.; the copper is "precipitated on the negative pole used, and is "to be collected and fused." The sulphite or other salt of soda remaining in the compartment "is to be used for the formation "of sulphide of sodium, or for the manufacture of caustic or car- "bonate of soda." "Dichloride of copper and sulphite or hypo- "sulphite of soda are respectively formed when sulphite of di- "oxide or of oxide of copper are added to acqueous solutions of "common salt, when the said reaction is immediate, and if at the "same time the said solution be heated and fully saturated with "the said dichloride, the latter on cooling precipitates in numerous "white crystals. The sulphites of either oxide or dioxide of "copper are to be formed and used in the reactions last described "by passing aqueous solution of sulphurous acid in contact with "the oxide or carbonate of copper in contact with the dioxide of "copper, any of which said substances should be in fine powder." "By digesting finely divided sulphur with any of the said last- "described solutions of copper, in which a sulphurous salt of soda "exists, and heating the same," the copper is precipitated therefrom as disulphide, which is to be treated as before described.

Third. A "solution of sulphate of copper, acidulated with sul- "phuric acid, may be decomposed into copper and sulphuric acid "in the following manner:—Into the negative compartment of a "glazed stoneware decomposition cell is poured" the copper solution, "in which a porous cell is to be immersed; into the said "porous cell is then conducted sulphuric acid water (1 to 4); a "carbon anode is immersed into the said porous cell, and connected "with the negative pole of a single series of the battery cells used "in the foregoing operations; a copper cathode is then immersed "into the said solution of sulphate of copper, and is connected "with the positive pole of the said series of battery cells." The decomposition cell and contents are heated to about 212° F., and sulphurous acid passed rapidly through the same. "Copper is "precipitated on the said cathode and sulphuric acid released and "formed at the said anode. Sulphate of copper is to be con- "stantly supplied to the said negative compartment. The sul- "phuric acid as it accumulates in the said decomposition cell is "to be used for the purpose of dissolving out further portions of "copper from the copper ores."

[Printed, 10*d*. Drawing.]

A.D. 1862, July 28.—N° 2136.

NOBLE, Alfred.—" Improvements in obtaining and treating " compounds of alumina." These are, first, taking " clay or " material containing variable quantities of alumina, oxide of iron, " and water," grinding it to a fine powder and calcining it " in " reverberatory furnace at a low red heat," and exposing it on trays in a chamber to hydrochloric acid gas, " care being taken " that the temperature of the gas is somewhere about 200° F." " If the temperature is too high no action will take place, and if " too low the compound will become partly liquified." The result, named " crude chlor-alum, is in a dry state ; it consists of " a mixture of chloride of aluminium with some chloride of iron, " silica, water, and other substances."

Second, purifying crude chlor-iron from iron and free acid by heating it for some time with stirring at a temperature " between " 212° and 240° F., and it is well to pass a current of air over it," by which means chloride of iron is decomposed, " hydrochloric " acid being driven off and oxide of iron remaining." " When " chlor-alum thus prepared is treated with water chloride of " aluminium dissolves," and insoluble oxide of iron are separated by filtration, an almost pure solution of chloride of aluminium is obtained. This process for " purifying crude chlor-alum is applicable to the purification of impure chloride of aluminium, in " whatever way the same may be obtained, when it is required to " separate therefrom iron or free acid." A pure soluble chloride is obtained by evaporating the above solution. On calcining this chloride a very pure concentrated form of hydrochloric may be condensed; a very pure alumina remains suitable for making aluminium, aluminate of soda, acetate of alumina, &c.

[Printed, 4*d*. No Drawings.]

A.D. 1862, July 28.—N° 2142.

JULLION, John Louis.—(*Provisional protection refused.*)— " An improvement in anti-chloride for paper making." This consists in exposing the sulphurets of calcium, " known as either " soda waste or as gas lime, to the action of atmospheric air until " nearly all the sulphuret of calcium is oxidised into hyposulphite " of lime;" dissolving this out with water, destroying " any " remaining sulphuret that may be in solution with an acid (such

" as sulphuric or muriatic)," and evaporating "the resulting " liquor to dryness or to a strength that the salt will crystallize, " as may be required."

[Printed, 4*d*. No Drawings.]

A.D. 1862, July 29.—N° 2155.

HENRY, MICHAEL.—(*A communication from Jean Baptiste Vasseur and Victorien Joseph Janssens.*)—" Improvements in " obtaining fibrous materials and paper pulp; in treating, cleansing, and scouring fibrous materials and fabrics manufactured " thereof; in producing soap for the said operations; and in " obtaining products from liquors used therein." These are, in reference to this subject, the production of picric acid as follows: —A highly caustic soap is employed upon various plants in disintegrating them, and "the liquors in which the caustic soap had " been used in disintegrating matters to extract the fibres, or in " the operations of scouring, boiling, or treating fibres or fabrics " to discharge gum and grease therefrom," are treated with acids, " preferring sulphuric and sulphurous acids;" "a precipitate will " be formed which may be collected and employed for the manufacture of picric acid." "The residuary acid solution having " an alkaline base may be concentrated by evaporation," and what is called "caustic soap may be manufactured therefrom."

[Printed, 8*d*. Drawing.]

A.D. 1862, August 13.—N° 2265.

DICKSON, JAMES.—(*Provisional protection only.*)—" Improvements in the manufacture of chlorine for commercial purposes." " Aqueous solution of chloride of sodium, common salt, sea " water, hydrochloric acid, the chlorides of iron, and other suitable " chlorides are heated and subjected in a decomposition cell to " the influence of a current of voltaic electricity;" the chlorine appears at the carbon anode. A porous medium or mediums may be used, although in some cases they can be dispensed with. To assist the decomposition, the following substances are amongst those employed:—" Nitric, nitrous, sulphurous, or sulphuric acids, " or oil of vitroil, the chloride or sesqui-chloride of iron, sulphate " or chloride of copper, peroxide of iron or of copper."

To liberate the chlorine, oxygen gas is passed "into or through " " certain heated or ignited chlorides." The oxygen is obtained for this purpose "either by the voltaic decomposition of acids and " salts which do not contain hydrochloric acid, or by the decom- " position of alkalies in the said decomposition cell."

Chlorine may also be obtained "from fused common salt, and " from other suitable chlorides or fused compounds of chlorine, " by immersing therein appropriate anodes and cathodes, which " are then connected with the terminal poles of a voltaic battery."

[Printed, 4*d*. No Drawings.]

A.D. 1862, August 13.—N° 2275.

VERSTRAET, Louis Désiré, and **OLIVIER**, Etienne Maurice.—" A new process of manufacturing carbonate of soda " by the application of sulphuret of sodium, and in apparatus for " the same." " Sulphuret of sodium alone in the presence of " carbonic acid, only produces a very small portion of bicarbonate " of soda, but on the contrary creates a large quantity of hypo- " sulphite of soda." " In order that the sodium of the sulphuret " may combine with the carbonic acid injected in the solution it ' requires to be in the presence of an oxidated agent capable of " absorbing hydrosulphuric acid immediately it forms ;" lime is the agent, employed as milk of lime. " The excess of carbonic " acid necessary for the production of bicarbonate of soda, acting " in its turn on the production of the latter upon the oxysulphuret " of calcium which is formed, transforms it into carbonate of lime ' by setting the hydrosulphuric acid at liberty." By the combustion of this acid in a space filled with oxygen or air it is converted into sulphurous acid, which is transformed into sulphuric acid in the leaden chambers. This combustion is effected in furnaces for the combustion of iron pyrites. Carbonic acid is produced by the combustion of a mixture of coke and charcoal in a cast-iron receiver or in a blowing machine which is furnished with a continual supply of air.

The furnace for the transformation of the marine salt into sulphate of soda, and that of sulphate of soda into sulphuret of sodium, is so constructed that the flame from the fire shall give up the greatest quantity of caloric. Above the sole part of the furnace farther from the fire is a leaden boiler supported by plates of iron containing a mixture of marine salt and sulphuric acid; the vapours of the hydrochloric acid pass off by an earthen tube into a condenser. The sulphate of soda formed passes into the sole part of the furnace below the leaden boiler, where it is calcined after which it is passed to the sole next the fire, where it is mixed with charcoal and three or four per cent. carbonate of lime and calcined, and the sulphuret "formed is withdrawn from the furnace; " the subsequent operations follow the same course." The apparatus for washing, &c. the sulphuret and treating it with carbonic acid, &c. are described. Another mode besides the one specified above for the production of carbonic acid is the calcination of the carbonate of lime; the gas is collected in a gasometer. The same process is applicable "for the manufacture of carbonate " of potash by decomposing sulphuret of potassium;" and "in " the manufacture of salts of potash in a similar manner." "The " more readily to manufacture the sulphurets of these two bases, " instead of directly decomposing the sulphates of potash and " soda by means of the charcoal," employing "a solution of " sulphuret of barium for producing these two alkaline sul- " phurets." The natural sulphate of barytes is decomposed in a furnace with charcoal, thus obtaining sulphuret of barium soluble in water. When this solution is mixed with a solution of an alkaline sulphate a solution of sulphuret of potassium or of sodium is obtained, and " also a white prepipitate of artificial sulphate of " baryta, which after several washings in water is ready for the " market."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1862, August 13.—N° 2277.

SCHNELL, WILLIAM.—(*A communication from Ludwig Mond.*) —(*Provisional protection only.*)—" Improvements in extracting " the sulphur and sulphurous acid from the oxysulphuret of " calcium which is contained in the residues or waste material " obtained in the manufacture of soda." These are, spreading the waste material moistened with water upon "great " hurdles superposed one upon another in the same manner " as those used in a common drying room" for "about two or " three weeks, but never more than a month," removing the material and washing out the hyposulphite of lime with water " at 30 or 40 centigrad." The undissolved material is treated as above a second time. These solutions are boiled while muriatic acid is added, sulphurous acid is evolved, and "the sulphur will " be found at the bottom of the boiler in a pure state." "To " obtain sulphur alone, the hyposulphite of calcium is evaporated" to dryness and distilled in iron retorts; "half the sulphur" is "evolved, and the residue is a mixture of sulphite of calcium, "sulphate of calcium, and sulphuret." "To obtain sulphurous "acid only the solution, when evaporated as before, is to be "heated in furnaces with an unrestrained access of air;" "half "the sulphur" is evolved as sulphurous acid, and "the residue "left in the furnace is entirely composed of sulphate of calcium."

[Printed, 4*d*. No Drawings.]

A.D. 1862, August 14.—N° 2296.

HERAPATH, William Bird.—"Improvements in treating "crystallizable sugar to render it more suitable for fermentation "and conversion into alcohol and vinegar." These are, "to each "hundredweight of cane or beat sugar dissolved in water so as "to form a syrup of the gravity of from 8° to 35° Beaumé," adding "from 3 to 4 fluid ounces of pure hydrochloric acid, having "a specific gravity about 1·160, previously diluted with water or "not as found desirable," maintaining "the solution at a tem-"perature varying from 180° F. to 212° F., from a period varying "from 1 to 3 hours, at the expiration of which time the desired "change in the composition and properties of the sugar will be "effected," observed by the polariscope, the primitive rotation from left to right being reversed. The acid is neutralized by carbonate of soda, or potash, or lime, lime water, milk or cream of lime, or "any other suitable substance," and the temperature reduced is "in a fit state for undergoing the process of fermenta-"tion;" but, "if the color of the sugar employed has been dark "or high colored, it might be necessary for some purposes to "further submit it to a decolorizing or bleaching process." This "may be accomplished by employing a solution of hypochlorite "of lime or hypochlorite of soda, which, containing as it usually "does, free lime, or in the latter case carbonate of soda, also readily "neutralizes the acid, and discharges the colour at the same time." The proportions of acid, periods, or temperatures, may vary from the above.

[Printed, 4*d*. No Drawings.]

A.D. 1862, August 20.—N° 2330.

HUTCHINSON, William Hodgson.—(*Provisional protection only.*)—"Improvements in the manufacture of ammonia and the

" prussiates of potash or soda, and in apparatus employed in such " manufactures." These are, first, submitting "refuse gluten " and nitrogenous matters of starch and other manufactories," to destructive distillation in retorts along with lime or soda and lime condensing the ammonia evolved. The crude liquor thus obtained may "be purified by adding an acid and crystallizing " by filtering or redistilling." "The prussiates of potash or " soda are obtained by fusing the gluten or other matters in an " iron pot or retort with potash or soda; the fused mass then " lixiviated with water, filtered, or decanted, and the prussiates " of potash or soda are crystallized from the solution," or the gaseous products from the destructive distillation of gluten or other matters are passed "over a mixture of charcoal and potash, or soda, and iron, heated to redness; the charcoal is then " lixiviated with water and treated as before."

Second. In manufacturing ammonia, using a retort "fitted " with a worm having a double action for feeding and discharging." In manufacturing prussiates using an iron pot or retort with pipes which convey away the "gaseous products evolved " during the operation and hitherto wasted" to be utilized; the pot or retort is closed "by a lid, to which is affixed an apparatus " for feeding, consisting of a hopper or worm." "A shaft passes " through the lid and turns an agitator in the pot or retort." " The gaseous products are utilized by appropriate means, either " as ammonia or as prussiates of potash or soda, or they may be " turned under the furnace of the pot or retort and effect an " economy of fuel."

[Printed, 4*d*. No Drawings.]

A.D. 1862, August 27.—N° 2373.

COFFEY, JOHN AMBROSE, and REDWOOD, THEOPHILUS.—" Improvements in the manufacture of salts of ammonia, and " other products from the ammoniacal liquors of gas works and " animal charcoal works, and in the still or apparatus to be used " in such manufacture." These are, as follows:—"The ammoniacal or other liquor to be operated upon is made to run " through a still constructed upon the principle of the well-known " Coffey's still," but simplified in construction, and consisting of " a series of short cylinders with intervening plates, or of a long " cylinder with partitions or diaphragms therein." "Each plate

" or diaphragm has an orifice connecting one compartment or " short cylinder with another, and to each orifice there is a flange " to prevent the liquor dropping through until there is a lodg- " ment." The liquor to be distilled is introduced into the upper part of the still on the surfaces of intersecting plates, while steam from a boiler enters at the lower part and " passes upwards, thus " coming into contact with the ammoniacal liquor and causing " the separation from it in a gaseous state of the ammonia and " salts of ammonia present, and of other gases and vapours," which are conveyed through a series of vertical tubes or cylinders which are filled with " pieces of coke and pumice-stone, through " which sulphuric or muriatic acid diluted with water is kept con- " stantly running." The ammonia is absorbed, forming either sulphate or muriate of ammonia, which passes in solution into there receivers underneath the cylinders. " When the acids are " neutralized with ammonia they will form strong solutions, from " which the ammoniacal salts may be obtained in crystals either " by the cooling or evaporation of the solutions." The gases that are not condensed in the cylinders are brought into a chamber like a dry lime purifier, in which are perforated shelves, with oxide of iron made from acting on protosulphate of iron with slaked lime. This is renovated by repeated exposure to the atmosphere, and when inefficient the sulphur is recovered " by sublimating," or it may be made into " oil of vitriol in the usual way."

[Printed, 8*d*. Drawing.]

A.D. 1862, September 1.—N° 2414.

WALKER, JAMES.—" Improvements in the treatment of kelp " and in the manufacture of products therefrom." These are, first, a solution of the soluble portions of the kelp " known to " manufacturers of iodine as 'finish liquor,'" is " neutralized with " sulphurous acid, and the resulting sulphites and hyposulphites " of soda are separated by evaporation and crystallization." The residual mother liquor is treated as after described.

Second, " the finish liquor or kelp solution is neutralized with " sulphurous acid and then boiled with sulphur, or is first boiled " with sulphur and then neutralized with sulphurous acid." Instead of " neutralizing with sulphurous, the liquor, either before " or after boiling with sulphur, may be oxidised by exposure to " atmopheric air in a tower with coke, or by other known means," and the oxidized liquor is treated as in the first plan; the residual mother liquor is treated as after described.

Third, adding "to the finish liquor or kelp solution a soluble " salt of iron, manganese, or alumina, so long as a precipitate is " formed, or it is neutralized with sulphuric, muriatic, or nitric " acid, or with mixtures of such acids and salts, such, for instance, " as that known to manufacturers of iodine as 'sour lye,' or that " known to manufacturers of chlorine as still liquor." In preference leaving the mixture slightly alkaline. "After settling, the " clear liquor is drawn off to be treated as in the first place, the " residual mother liquor to be treated as after described."

Fourth, adding "to the finish liquor or kelp solution boracic " acid in sufficient quantity to form borax (biborate of soda.)" The borax is crystallized out; "hyposulphite of soda is obtained " by further concentration" of the mother liquor. The residual mother liquor and those herein-before referred to are treated as follows:—"The liquor is evaporated to dryness and fused at a " moderate heat to decompose the remaining hyposulphite." The fused "products consist chiefly of iodide of sodium with sulphates " of soda and potash and traces of other salts." This product is dissolved and the sulphates of soda and potash crystallized out. To the mother liquor carbonate of potash or chloride of potassium are added in certain proportions, and "the iodide of potassium " is crystallized in the usual manner after separating the carbonate " of soda or chloride of sodium, as the case may be."

" By another plan, the residual mother liquor has added to it " hydrochloric acid to decompose the remaining hyposulphite " (avoiding excess)," evaporating to dryness, fusing at a moderate red heat; the fused mass is dissolved, the soda salt separated, and the iodide of potassium crystallized, any deficiency of potassium being made up by adding "chloride of potassium or carbonate of " potash."

Fifth, evaporating "the finish liquor or kelp solution" to dryness, fusing at a moderate red heat, mixing "the fused mass " with as much boracic acid along with an oxidised substance as " will decompose the iodide of sodium and take up the soda from " the other decomposable salts, and at the same time form borax." The "oxidizing substance preferred is binoxide of manganese," but others may be used with advantage, as nitrate of soda or potash, chlorate and chromate of potash, or peroxide of iron. " The mixture is heated to redness in a retort of iron or clay, and

" the iodine which distils over is collected in receivers in the usual " manner." This process may also be adopted for separating iodine from the fused iodides described above. " After separating " the iodine " the residue is dissolved and the borax crystallized.

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 2.—N° 2426.

HUNT, William.—" An improvement or improvements in the " manufacture of muriate of ammonia." This consists in " ma- " nufacturing muriate of ammonia by passing a mixture of " volatilized muriatic acid and atmospheric air or uncombined " nitrogen through burning coke or coal or other carbonaceous " fuel, or passing a mixture of atmospheric air or uncombined " nitrogen through ignited fuel, with which fuel has been mixed " chloride of manganese, or chloride of iron, or other chloride " capable of yielding chlorine or muriatic when heated." The vapour of water is also passed through the ignited fuel along with the " muriatic gas or chlorine," and the atmospheric air or " un- " combined nitrogen obtained from any convenient source," " the " vapour of water is decomposed by the ignited carbon, which " combines with the oxygen of the water, and the nascent " hydrogen entering into combination with the nitrogen present " forms ammonia, which with the muriatic acid gas, also present, " forms muriate of ammonia." " The waste combustible gases " from blast furnaces and other furnaces may be used," the " gases being mixed with muriatic acid gas, and made to burn in " the furnaces of steam engine boilers or in other furnaces." When muriatic acid cannot be employed the chlorides of manganese, iron, or sodium, or the residue from the chlorine manufacture, dried, may be employed by passing them into " the blast or " other furnaces, or mixed with the coal or coke fuel used in the " furnace, and a little steam is passed through the fire." The muriate of ammonia condensed is purified by neutralizing with lime, evaporating to dryness, and subliming.

[Printed, 8*d*. Drawing.]

A.D. 1862, September 3.—N° 2434.

GARTON, Charles.—(*Provisional protection only.*)—" An im- " *proved* method of applying heat in the manufacture and re- " *fining* of sugar, and in malting, hop-drying, brewing, distilling,

" and vinegar making." This consists in " employing hot water " or other fluid as the heating medium, the heat being supplied " by self-acting circulation." A chamber or coil of pipes or a series of such are connected with a boiler by means of flow and return pipes, the former entering the chambers or coils and boiler at a higher level than the latter, and in case of chambers being used, the same being fitted with partitions extending nearly through their entire width, and at the highest point thereof, with pipes to allow of the escape of air." The whole is filled with water, and a fire is applied to the boiler, " which will cause the " fluid to circulate through the pipes and chambers or coils and " boiler, whereby the same degree of heat will be uniformly com" municated to the chambers or coils."

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 6.—N° 2462.

PUDNEY, Samuel. — " Improvements in apparatus to be used " in the manufacture of sulphuric acid." These are, employing " sheets of glass in the construction of the parts of the chamber." The floor may be of lead to contain the condensed acid, or it may be composed of sheets of glass, " by preference the edges of each " sheet being bent downwards and caused to dip into grooves " formed in the joists or supports which carry them; the con" densed acid collecting in these grooves will form a tight joint." " The sheets of glass to form the walls and roof of the chamber " are carried by uprights and rafters " grooved on each side to " receive the edges of the sheets, and such portions of them as " come within the chamber are covered with strips of lead." The glass at these joints lap, and are " rendered gas-tight when the " chamber is at work by the condensed liquid accumulating " between the plates of glass where they overlap." " Where the " upper edge of the leaden cistern at the bottom of the chamber " meets the glass the lead is bent into a U-form all round the top " of the cistern, and the lower edges of the glass are made to dip " into the small trough so produced, and as liquid quickly accu" mulates in this trough when the chamber is at work a gas-tight " joint will be formed." Where luting or cement is required, employing " for the purpose oily, fatty, or resinous substances " mixed with pipeclay or other material likely to be little acted on " by the acid."

[Printed, 10*d*. Drawing.]

A.D. 1862, September 11.—N° 2508.

WARD, PETER.—" Improvements in the manufacture of a double " sulphide of calcium and sodium." These are, " 144 parts of " the crude sulphate of soda, commonly called salt cake," are mixed " with from 120 to 130 parts of dry black-ash waste " from soda making, or " instead of using dry waste using it fresh from " the vats, allowing for the water which it may contain," and submitted " to a bright red heat for from 12 to 16 hours, or longer, " according to the quantity used at a time for a charge in a " retort." The charge is drawn, and on cooling is fit for use. The retorts used have pipes at one end " to convey the carbonic " oxide gas produced from the decomposition of the materials " into the fire to be burned." Too much carbon in the soda waste should be avoided, and if too little more should be added. The above proportions will vary. " The double sulphide of cal- " cium and sodium may also be obtained by heating gypsum with " sulphate of soda, lime, and carbon, different proportions are ' given. In place of using retorts using a black ash furnace with dampers, " one to shut off the air from the fire-place while working " the materials in the furnace, and another to regulate the draught " of the furnace, as it is desirable to work with as little draught " as possible after the furnace has been heated up and the salt " cake fluxed, or during the time the compound is undergoing " decomposition."

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 15.—N° 2535.

WEBSTER, JAMES.—" Improvements in the manufacture of " nitric and nitrous acids, and other nitrogenous compounds." These are, nitrates of soda or potash are mixed with about three times their weight of broken pumice-stone or other like substance, and distilled in a fire-clay horizontal retort, with a valve in front for regulating the admission of air, and openings " at the rear " furnished with a pipe to carry off the gases or vapours to the " generator or condenser," consisting of " a number of trays or " divisions, upon which are laid the following materials (varying " according to circumstances) :"—Thus, " to make nitric acid and " nitrous acid, the materials upon the trays will be gravel, sand, " broken pumice-stone, or other similar substances, upon which the " acid will not act damped with water." To make any particular nitrate, placing "upon the trays, instead of the substances before-" named, the caustic base of such nitrate damped with water;" in the case of soda, "care must be taken that it be mixed with gravel" or sand to prevent its offering by its density any obstruction to" the passage of the gas, and to afford a larger surface for the" action of the gas. Carbonates, either alone or mixed with the" caustic, may also be employed if preferred." For a charge of two hundred pounds of nitrate the retort is kept at a bright red heat for about four hours, when the residue is withdrawn, and lixivated yields a solution, "which may be boiled down for caustic" soda or potass, as the case may be," and the pumice-stone, &c. dried, "may be mixed with a fresh portion of nitrate, and used" over again any number of times."

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 16.—N° 2542.

CLARK, William.—(*A communication from Leopold Eugène Lavigne.*)—"Improvements in the treatment of peat and peat tar" for the production or manufacture of various products, and in" apparatus for the same." These are, in reference to this subjuct, in treating the oils in the process of purification with a caustic alkali, an alkaline phenate is obtained, and "the alkaline" phenates obtained in all the previous operations are united, and" treated for phenic acid. It is separated from the neutral oils" by the successive action of alkaline or acid solutions in a less" and less concentrated state, and it is then distilled by heat" approaching the boiling point of this acid." "The raw phenic" acid is afterwards rectified by the ordinary processes." No processes are given.

[Printed, 1*s*. Drawing.]

A.D. 1862, September 18.—N° 2556.

MOND, Ludwig.—(*Provisional protection only.*)—"An improved" method of obtaining hyponitric acid and nitric acid from nitrate" of soda." This consists in heating to redness in common retorts a mixture of nitrate of soda "with a substance of basic or" of indifferent character, which is neither melted nor changed by" heating it with the nitrate of soda." "A great number of" substances can be used," but the following are preferred:—" The peroxide and the magnetic oxide of iron, the sesqui-

" protoxide of manganese (Mn_3O_4), which is always obtained by " heating any other oxide of manganese to redness, the oxide of " copper, the sesqui-protoxide of cobalt, and the proto-oxide of " nickel." By this process obtaining " a gaseous mixture composed of hyponitric acid, oxygen, and nitrogen, which can be " used immediately for the manufacture of nitric acid." "To " obtain nitric acid from the mixture of gases, it must be conducted over cold water contained in suitable vessels." " The " residue remaining in the retorts may be advantageously employed for the manufacture of caustic soda."

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 19.—N° 2565.

GLASS, William.—" Improvements in the treatment of sul-" phuret of antimony, and in obtaining products therefrom." These are said to be, "the production of oxide, sulphoxide, and " suboxide of antimony, metallic antimony, antimonious, sulphur-" ous, and sulphuric acids by the burning of sulphuret of anti-" mony in a fluid or melted state with pure oxygen, atmospheric air, " or both," and in " obtaining of gold, or silver, or other metals " (if they exist in the antimony ore or crude antimony employed)," as a residue of the process. " Sulphuret of antimony (antimony " ore or crude antimony), with or without additional sulphur or " antimony," is melted " by means of a fan or pump, or other " means," and " atmospheric air or oxygen gas, or both," is projected upon or into it or them, and the products of combustion are " conducted into tubes, flues, or chambers, where the oxides of " antimony are deposited in fine powder, and the sulphurous acid " gas may be collected or used as such, or it may be converted by " oxygen or steam (aqueous vapour) into sulphuric acid." " While a portion of impure metallic antimony remains in the " vessel after the operation has been continued for some time, and " may be purified for metallic antimony of commerce, or refined " for gold, silver, or other metals."

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 29.—N° 2645.

ELLIS, Henry.—" Improvements in the manufacture of com-" *pounds* of silica, and in the application of certain compounds " *of silica* to mineralize woven fabrics, paper, and paper pulp, to

" harden and preserve stone and cement, in the production of " artificial stone and paint, and in the production and glazing of " porcelain and such like manufactures." These are, in reference to this subject, manufacturing compounds of silica as follows:— First, precipitating "the compound silicates out of solutions of " silicate of soda or of potash, by means of solutions of any of the " salts of the metals or of the earths," straining and washing the silicates so obtained, and while recently formed, or in a gelatinous state, re-dissolving "them in as much as may be sufficient of a " solution of silicate of soda, or of potash, or of both." "If the " silicates have been allowed to get dry, the mixture is heated up " to the boiling point to facilitate their solution." "All gelatinous silicates, however obtained, may be made soluble in the " above manner, and by addition of carbonates of soda or of " potash."

Second. Solutions of boro-silicates, phospho-silicates, and chromo-silicates are obtained by "mixing saturated solutions of " borate of soda, phosphate of soda, or chromate of potash, with " an equal quantity by measure of solutions of silicates of soda, " of potash, or of both, of about 1·2 specific gravity, and then " precipitating by means of solutions of the metallic or earthy " salts, and washing and redissolving the recent precipitates so " obtained in the manner described." All the above compounds may be evaporated into a gelatinous state, and preserved "in air-tight vessels."

Third. Preparing "saturated solutions of silicates of soda or " potash, or of both, by adding to them recently prepared gelatinous silicic acid up to the point of saturation," such solutions being preferred "in all cases to the commercial soluble silicates." The remaining part of the Specification refers to the application of these silicates.

[Printed, *6d.* No Drawings.]

A.D. 1862, October 2.—N° 2667.

FIRMIN, GEORGE JORDAN.—" Improvements in the treatment " of certain salts of potash and lime." These are, utilizing the waste liquors arising in the manufacture of tartaric and citric acids, to obtain therefrom valuable products." First, "in the " manufacture of tartaric acid it is usual to take bitartrate of " potash, dissolve it in water, and add carbonate of lime." The precipitated tartrate of lime is separated, and the solution of tartrate of potash is treated with "muriate, sulphate, or nitrate of "lime," generally sulphate; tartrate of lime is again precipitated and separated, and sulphate of potash is in solution with some undecomposed tartrate of potash and some tartrate of lime. Formerly this solution was evaporated, and the potash salt obtained sent into the market; but according to this invention it is proposed to recover the tartaric acid. For this purpose it is evaporated, or otherwise, to a thin syrup, allowed to cool, any salts crystallizing out are removed, and to the remaining liquor, in preference, sulphuric acid is added, "until tartrate of potash is "no longer detected in the solution by the ordinary tests;" "bi-"tartrate of potash is produced, which, being nearly insoluble in "cold water, falls as a precipitate; it is separated and reworked." The sulphate of potash solution is evaporated for that salt. The salt obtained, together with that previously crystallizing out, is treated with sulphuric acid, and the acid liquor filtered, and the salts washed, and the acid water and washings are added at the beginning of the process.

Second. "Evaporating the highly colored washings" of "ci-"trate of lime formed in the ordinary process," by "a gentle "heat, to recover the citrate of lime," which is treated in the usual manner for citric acid. The washings are used in place of water in treating other lemon juices.

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 9.—N° 2729.

PALSER, Joseph Bence.—"Improved apparatus for manu-"facturing paper pulp, and recovering the alkali used in such "manufacture." This consists in "subjecting of straw and "other fibrous materials to the action of an alkaline solution in "rotating boilers under a pressure of from one hundred and "ten pounds to one hundred and thirty pounds to the inch, or "thereabouts." In reference to this subject, "the steam of the "boiling process is charged more or less with alkaline matter, which is "carried over and mixes with the contents of the boiler" underneath; the steam remaining in the same boiler forces up the "liquid into the vat above the boiler, where being still subjected "to the furnace heat," and also to the influence of a hot blast of air, rapid evaporation will ensue. The plugs are "drawn out of the "bottom of the charged vat, and the concentrated liquid is dis-

" charged in suitable quantities at a time on to the top of the " rotating boiler that is immediately below. The exterior of this " boiler becoming instantly enveloped by the descending liquid, " a rapid evaporation of the liquid takes place, it being assisted " by the dashing of the liquid from the boiler surface on to the " surrounding heated walls. The descending liquid (thickened " by the evaporation) falls into the basin or hearth below the " boiler, where it is collected, and under the action of the heat " absorbing surfaces with which it is in contact, it soon becomes " viscous. When in this state it is raked on to the hearth of the " reverberatory furnace, and being subjected there to the direct " action of the fire, all the moisture is driven off, the solvent " matters extracted from the straw under treatment, and, combined with the alkali, are then consumed, and the residuum is " the recovered alkali, which, when cool, is fit for use."

[Printed, 10*d*. Drawing.]

A.D. 1862, October 13.—N° 2756.

THOMAS, Charles.—" Improvements in the manufacture of " silicate of soda or silicate of potash, and in the manufacture of " artificial stone." These are, first, in making the above silicates in place of using " a close boiler, in which mechanical stirrers have " in some cases been arranged," mounting the boiler " so that it " can rotate or oscillate." " The boiler is kept in motion during " either the whole or a portion of the time occupied in the process " of solution, and in this manner there is produced a friction between the several particles of silica sufficient to rub off the " gelatinous coating formed by the caustic alkali on the same, " and thus the process of solution is greatly facilitated." In preference using " a jacketed boiler heated by steam, rotating or " oscillating horizontally," and employing " steam of a pressure " of about fifty pounds per square inch."

Second. Manufacturing artificial stone, preferring to use silicate of soda solution " of a density of 1750, and in the proportion of from 20 to 30 per cent. of the weight of the black ash " waste or burnt iron pyrites, or of those two substances in equal " parts. The mixture may be most conveniently effected in a " mortar pug mill. The compound on coming out of the mill " should be at once moulded to the form required."

[Printed, 10*d*. Drawing.]

A.D. 1862, October 23.—N° 2856.

BATH, Edward.—(*Provisional protection only.*)—" Improve-" ments in treating alkali waste to obtain sulphur therefrom." These are, adding to the "alkali waste" hydrochloric acid, sulphuretted hydrogen is evolved, and conveyed into " the bottom of " a tower filled with round smooth pebbles, through which water " is caused to percolate," where at the same time and place it meets with a stream of sulphurous acid, "produced by the calci-" nation in muffle calciners of either copper or iron pyrites, or " coarse regulus, or by the burning of sulphur." Water is caused to percolate down through the tower, and washes out the sulphur precipitated.

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 27.—N° 2894.

PEEK, Alfred.—" Improvements in apparatus for evaporating " saccharine and saline solutions." These are, "applying the " heat necessary for evaporating the solution in such a manner " that the temperature of the solution cannot be raised beyond " the boiling point of water, but it may be kept to any required " degree below that temperature," by means of hollow discs or " agitators made by preference of sheet copper attached to the " arms of a hollow axle revolving slowly in the pan containing " the solution to be evaporated." The agitator is half full of water, and it is supported on hollow trunnious, through one of which steam is admitted by a pipe, bent partly into the water, and through the other the overflow of water makes its escape. " The apparatus may be modified as follows:—Under the pan " containing the solution to be evaporated" furnished as above, " is placed a boiler filled with water and heated in any way; a " pipe from the upper part of the boiler communicates with one " of the trunnions of the agitators, and with a cistern above the " level of the agitators, and another pipe passes from the other " trunnion of the agitators to the lower part of the boiler." These improvements " for evaporating may be used when the solutions " to be evaporated are in open pans, or in covered pans furnished " with a chimney or with a fan to produce a draught, or in vacuum " pans." " When the heating surface presented by the revolv-" ing agitators is considered insufficient, an increased heating " surface may be obtained by inserting a series of steam pipes in

" the vessel containing the solution, such steam pipes to be " surrounded by other pipes containing water, the water pipes " being open at one point, at least, to the atmosphere."

[Printed, 10*d*. Drawing.]

A.D. 1862, October 27.—Nº 2895.

RICHARDSON, THOMAS.—(*Provisional protection only.*)—" Im- " provements in the manufacture of sulphate of soda." These are, " submitting common or rock salt to an elevated temperature, " and employing the same when so heated with sulphuric acid " for the manufacture of sulphate of soda."

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 29.—Nº 2909.

DARLINGTON, GEORGE.—" Improvements in the manufacture " of zinc oxide." These are said to be " the extraction of zinc oxide " from earthy carbonate of zinc (with or without flux) by heating " it in an open furnace with anthracite, coal, or other carbon- " aceous fuel," as follows :—" A coarsely ground mixture of the " ores of carbonate or silicate of zinc (with or without flux) and " anthracite, coal, or other smokeless fuel, is placed in a furnace " opening into passages leading to a collecting apparatus, and " subjected to heat produced by the combustion of similar smoke- " less coal or fuel." " The mixture may be placed in a separate " chamber of a furnace," and adequate heat derived from the fuel " made to pervade the entire mass ; or it may be mixed with " such heating material, and in either case the zinc oxide is " extracted or separated from the ore and deposited in the collect- " ing apparatus."

[Printed, 8*d*. Drawing.]

A.D. 1862, November 3.—Nº 2966.

TRACHSEL, FREDERICK, and CLAYTON, THOMAS.—" Im- " provements in machinery or apparatus for obtaining light, " heat, and ventilation, parts of which improvements are also " applicable to other purposes." These are said to be various improvements in the mode of obtaining light, described in No. 652, 1861. See Abridgements of Specifications upon gas. In reference to this subject this consists in introducing " a current of " air or gas into the liquid of the inner vessel, whereby the eva-

" poration of the fluids undergoing distillation is so hastened and " modified as to produce new results; the air or gases are ad- " mitted by a tube or pipe dipping in the liquid, and terminating " in a perforated rose bit, or a series of small holes in the pipe " under the level of the fluid. The air for the purpose is obtained " from bellows or other convenient air machine, and the gases to " be employed issue from weighted gasholders, or is driven by " any blowing or forcing apparatus with sufficient power to over- " come the pressure of the fluid in the inner vessel." The air or the gases may be heated by causing the tube through which they pass to be heated by some convenient means. This improvement, it is stated, among other things, is applicable to "the distillation " or concentration of certain acids such as acetic acid."

[Printed, 1*s*. Drawing.]

A.D. 1862, November 8.—N° 3017.

OGSTON, George Henry. — "Improvements in treating " nitrous acid and nitric oxide in order to convert them into " nitric acid." These are said to be "converting nitrous acid and " nitrous oxide into nitric acid by exposure, under pressure, to air " and moisture," and also the apparatus employed, consisting of a vessel "constructed of a material that will resist the action " of dilute nitric acid," preferring "Yorkshire slabstones free " from lime. The joints of such stones may be grooved, rabbeted, " or plain, put together with suitable cement," and the whole bound "together with iron bolts and binders." In this vessel are two funnel tubes, through which nitric acid and sugar solution, as in manufacturing oxalic acid, are introduced. This vessel is connected with a series of condensers, numbering from fifteen to twenty, containing water, and each supplied with compressed air from a pipe. Each condenser has what is termed "an equilibrium " tube," which is an open tube passing through the top of the condenser under the liquid, "to prevent the return of the liquor in " the event of unequal pressure in the respective condensers." In the generator is a manhole, a float to indicate the height of the liquor, a thermometer, and a tap to draw off the oxalic acid solution. In all cases where oxides of nitrogen "can be collected " and forced through the regenerating or condensing vessels a this "apparatus may be used." Nitrous gases that pass from " *vitriol chamber* are condensed in oil of vitriol, which is afterwards used to decompose nitrate of soda; "nitric acid is first collected as "usual, and the nitric oxide and nitrous acid at the same time "evolved are conducted through" the above "apparatus under "pressure, and there converted into nitric acid."

[Printed, 8*d*. Drawing.]

A.D. 1862, November 8.—N° 3021.

SONSTADT, Edward.—"Improvements in the manufacture of 'the metal magnesium." These are said to be, first, "to the "manner of preparing magnesia or its carbonate, so that it may "be in a suitable state for the obtainment from it of magnesium," by precipitating Epsom salts with soda or carbonate of soda, allowing the precipitate to subside, decanting off the water, washing the precipitate repeatedly in hot or boiling water, and drying it between each washing, either by strong pressure or by a centrifugal machine." These alternate washings and dryings are repeated "until the wash water shows no precipitate with solution "of chloride of barium which has been acidulated with nitric "acid."

Second. "To the preparation of an anhydrous compound con"taining magnesium, chlorine, and sodium, from which mag"nesium may readily be obtained, either by electrolysis of the "fused material, or by its reaction with sodium." The pure magnesia obtained above is dissolved in hydrochloric acid, a small quantity of magnesia remaining undissolved, and after boiling the solution is decanted or filtered, and adding to the solution "chloride of sodium in such quantity that for every pound of "acid of sp. gr. 1·152, 0·55 lbs. of chloride of sodium" is used, the whole is evaporated to dryness, in preference in a silver dish. The dried material is then placed in a platinum crucible, loosely covered, and heated to full redness; when it enters into tranquil fusion the operation is complete, and the material should be kept in a dry vessel. Common salt is freed from sulphuric acid by chloride of barium, excess of barium is precipitated by carbonate of soda, and the liquid is neutralized by hydrochloric acid.

Third. Preparing "anhydrous chloride of magnesium by slowly "heating the hydrated chloride to redness in a current of dry "hydrochloric acid." The processes remaining refer to the manufacturing of magnesium.

[Printed, 6*d*. No Drawings.]

A.D. 1862, November 11.—N° 3041.

MARRIOTT, Edward, and HOLROYD, Samuel.—" Im-" provements in the purification of gas, and in obtaining certain " useful products therefrom." These are, first, " the combined " use of sulphate, or other salt of iron, and ammonia, or other " alkali or alkaline salt." To a solution of the salt of iron alkali is added until the solution has a " decided alkaline reaction." This is pumped through " the ordinary gas scrubbers ; but as " the iron will become decomposed during the process of purifica-" tion, small quantities must from time to time be added."

Second. " The use of sulphide or sulphuret of iron." The sulphide or sulphuret is derived from other sources than the above, for " purifying gas, either in the wet or the dry way." If in the former, the sulphide obtained by any usual process in a fine state of division, is suspended in water, while " through this mixture " the gas is passed by any convenient arrangement of pipes." For the dry way, the sulphide or sulphuret of iron is mixed with sawdust, coke, &c. so as to form " a porous mass, through which " the gas may be passed." The sulphide of iron is obtained by treating lime used in purifying gas with a solution of sulphate of iron, applying " the solution of sulphate of iron by sprinkling " only, or other moderate use, so as to prevent the lime from " becoming too pasty."

Third. Obtaining " as bye products, sulphate of ammonia, " compounds of cyanogen and sulphide of iron, which may be " used for manure, for obtaining sulphur, or for other ordinary " purposes " in carrying out the first part of the invention.

[Printed, 4*d*. No Drawings.]

A.D. 1862, November 17.—N° 3085.

BINKS, Christopher.—(*Provisional protection only.*)—" Im-" proved methods of obtaining oxygen and chlorine gases." These are, first, causing " a mixture of hydrochloric acid gas and oxygen " gas, or a mixture of hydrochloric acid gas and atmospheric " air, or atmospheric air " to which oxygen gas has been added, in preference in a dry state, " to be brought into contact with " concentrated or strong sulphuric acid, either under ordinary " temperatures or under temperatures higher than ordinary ones, " in order to effect the decomposition of the hydrochloric acid " with the liberation of its chlorine in the form of gas."

Second, projecting "strongly heated oxygen gas or atmospheric " air, or a mixture thereof," into liquid hydrochloric acid, "in " order to effect the decomposition of the acid and liberation from " it of gaseous chlorine."

Third, causing strongly-heated oxygen or air, or mixtures thereof, to be brought in contect with an excess of hydrochloric acid at ordinary temperatures in the first instance, for the "libera- " tion of the chlorine in the form of gas." Pipes convey away the water and excess of hydrochloric acid. Substances to combine with the hydrochloric acid gas may be employed.

Fourth, bringing into contact with water or steam strongly heated chlorine, oxygen gas is liberated, and hydrochloric acid is formed. "Substances capable of absorbing or combining with " the hydrochloric acid formed" are added. Second, applying heated dry chlorine to the manganese or other oxides at ordinary temperatures or otherwise, a chloride of the metal is formed, and the previously combined oxygen is liberated in the form of gas. The chloride of manganese may be applied to useful purposes, or treated for its recovery as described in N° 1240, 1861.

[Printed, 4*d*. No Drawings.]

A.D. 1862, November 21.—N° 3134.

SWINBURNE, Robert Walter. — (*Provisional protection only.*)—" Improvements in the manufacture of soda." These are, fusing chloride of sodium and "injecting into the fused mass at " the bottom, by preference, or below the surface thereof, super- " heated steam or other suitable gaseous fluid, hydrochloric acid " is evolved and condensed, while soda or carbonate of sada re- " mains in the vessel in which the operation has been performed." Also, vaporizing the chloride of sodium, and "injecting super- " heated steam or other suitable gaseous fluid into and amongst " such mass, or while contained in a heated retort or vessel."

[Printed, 4*d*. No Drawings.]

A.D. 1862, November 26.—N° 3175.

NEWTON, Alfred Vincent.—(*A communication from George Lewis.*)—" An improved mode of preparing oxide of zinc as a " pigment." These are, " subjecting it to the combined actions " of friction and pressure," by means of " revolving chasers or " edge runners, such as are commonly used for tempering flax seed

" for the manufacture of linseed oil." The grinding is continued for about half an hour, by which it is stated, it is " reduced to " nearly one-half of its original bulk." " By subjecting the " oxide to the operation of the chasers for a longer time than " that above mentioned, a more highly condensed product may " be obtained, which will take a less quantity of oil, and will " increase the opacity of the paint."

[Printed, 4*d*. No Drawings.]

A.D. 1862, November 27.—N° 3178.

HARTLEY, Frederick William.—(*A communication from George Huwitz.*)—(*Provisional protection only.*)—" Improved " means of obtaining certain products resulting from the manu- " facture and purification of coal gas." Oxide of iron, " in the " form of ore, or otherwise," is roughly ground, and " mixed in " proper proportion with sawdust or old tan, but tan is used by " preference; the mixture is then placed in the purifiers on " wooden trays." " After so much gas has been passed through " the oxide that it ceases to purify, atmospheric air must be blown " through the purifiers, by which process the iron becomes " reoxidized." " The air thus blown through the purifiers, takes " up a large portion of ammonia and carbonate of ammonia in " its passage; this can be collected by suitable known means by " bringing it in contact with sulphuric acid. The material, thus " reoxidized, can be used over and over again without removal " from the purifiers, until (by the accumulation of tar and of " sulphate of ammonia, which the air will not act upon) the " oxygen in the air ceases to have any effect upon the iron." When this is the case, the material is removed and washed with gas water, and afterwards " with water if required, and after a " few days' exposure to the air it may be again used for purifi- " cation." " The liquor from the oxide collected " is treated with sulphuric acid and evaporated. The liquor " will have lost " its peculiar smell of sulphuretted hydrogen, which is taken up " by the hydrated oxide of iron contained in the iron ore."

[Printed, 4*d*. No Drawings.]

A.D. 1862, December 12.—N° 3334.

FOX, Samuel.—" Improvements in retorts and apparatus em- " ployed for the manufacture of gas, and also in purifying gas."

The first part of these improvements relates to retorts. The second has reference to this subject, and " consists in a mode of " purifying coal gas by employing iron turnings or filings." " These turnings or filings of wrought or cast iron, are used in " apparatus such as are known as dry-lime purifiers, and such as " these, wherein precipitated or other oxides of iron have been " heretofore used for like purposes." These turnings or filings are applied in their metallic state, as free from oxides as possible before they are used. The gas is caused to pass through the same until it begins to " indicate that the iron is no longer acting sufficiently, when the turnings or filings are to be removed from the purifiers, and for a time subjected to the action of the atmosphere, in like manner to that resorted to when using precipitated or other oxides of iron for like purposes.

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1862, December 18.—N° 3383.

LEPAINTEUR, Edmond.—" Improvements in the fabrication " of a salt for dyeing textile materials." These are, " saturating " at the ordinary temperature hydrochloric acid with quicklime or " carbonate of lime, in the proportion of one part of quicklime or " carbonate of lime to three parts by weight of hydrochloric acid " marking 22 degrees on Baumé's areometer. The liquid thus " obtained is next heated and evaporated until it marks 45 degrees " on Cartier's acid guage; it is then allowed to rest until it crys- " tallizes, which it does very shortly." " To this salt, from its " special affinity with the various coloring matters, has been given " the name of chromogene." " The product or salt above men- " tioned " is not claimed, " but the fabrication of it in such quan- " tities as to be used in commerce, and its application to the dye- " ing of textile materials, animal and vegetable," is claimed.

[Printed, 4*d.* No Drawings.]

A.D.1862, December 22.—N° 3418.

CLARK, Matthew.—" Improvements in treating waste liquors " obtained when dying Turkey red colours." These are, treating the liquor produced " in the process of Turkey red dyeing by the " new or machine process " with sulphuric, nitric, muriatic, or other acid, this causes the oil "to come to the surface; this oil is "then skimmed off, and the liquor remaining has hitherto been "considered waste and useless, and ran away to the stream;" this liquor is evaporated down "to about 25° Twaddel," and sulphate of potash or soda crystallized and "removed from time to time "with a perforated iron ladle, placed on a drainer, and dried." "When nitric, muriatic, or other acid has been added the process "is conducted in a similar manner, except that the degree of concentration to which the liquor is brought before it is allowed to "cool and crystallize will be somewhat altered, as will be well "understood by workmen used to the crystallizing of potash and "soda salts."

[Printed, 4*d*. No Drawings.]

A.D. 1862, December 24.—N° 3438.

HENDERSON, WILLIAM.—"Improvements in obtaining iron "and steel from certain ores and residual products." The residual products are those after the treatment in N° 2900, 1859. These products are mixed with coal and various other substances according to the nature of the product required, and then reduced. Sometimes a larger proportion of manganese is required with the iron, and the employment of "artificial carbonate or oxide of "manganese" is claimed. "The carbonate and hydrated oxide "of manganese are cheaply obtained from the waste chloride of "manganese solutions produced in the manufacture of bleaching "powder from the native peroxide of manganese and muriatic "acid." To the waste acid solutions a very slight excess of milk of lime is added, "taking care to leave no lime amongst the precipi-"tated oxide." The chloride of calcium solutions are run away, and the precipitate washed and used in the mortar mill "about "the consistence of clay for making bricks, care being taken to "ascertain how much dry hydrated oxide it contains," as all the mixtures are calculated as dry. "The carbonate of manganese is "obtained from the same waste solutions by using carbonate of "of lime, heat and pressure being necessary to complete the pre-"cipitation in this case." "The native black oxide of manganese "may be used instead of hydrated oxide or carbonate, but it "requires a much larger proportion of carbon, is more costly, and "*far more* difficult to reduce to the state of metal," therefore

" the artificial protoxide or the carbonate for all purposes of " reduction " are preferred. The remainder of the Specification refers to improvements in obtaining iron and steel from residual ores, &c.

[Printed, 6*d*. No Drawings.]

1863.

A.D. 1863, January 6.—N° 44.

LEIGH, John.—Improvements in the treatment of gas produced by the distillation of coal, cannel, bituminous shale, boghead mineral, oils, petroleum, or other combustible substances, and for the obtaining of certain products therefrom." These are, subjecting gas obtained as above to the action of nitric acid or a mixture of nitric and sulphuric acids. This is best effected in " a series of earthenware vessels of the form and arranged in the " manner of Woulfe's bottles." The gas is passed through the acid so as to remove its benzole from it as nitrobenzole, when the operation is completed, removing the " nitro-benzole and " other products separating themselves from the acid liquid, and " which acid liquid may be employed after the removal of the " products above mentioned for purposes where weak nitric and " oxalic acids may be required, containing as it does a consider- " able quantity of the latter acid; or the oxalic acid may be " separated therefrom by well known methods." " Where a " mixture of commercial nitric and commercial rectified sulphuric " acid is employed," in preference using " one part of nitric acid " to two parts of sulphuric acid; and when fuming nitric acid is " used," in preference using the strongest.

[Printed, 4*d*. No Drawings.]

A.D. 1863, January 10.—N° 91.

POWERS, Edward, and DALE, John Gallemore.—(*Provisional protection only.*)—" Improvements in the manufacture " of caustic soda and potash, and carbonates, chromates, and " stannates of the same alkalis." These are, placing the chloride of potassium or sodium in a suitable vessel, and fusing the same, and causing " steam as it is evolved or superheated " to pass " through the mass by means of a pipe which dips downward, or

" by other suitable arrangement, which will after the same manner " bring the steam into intimate connexion with the chloride." " To assist the conversion into caustic alkali," if found necessary, adding " metallic iron or oxide of iron, alumina, manganese, or " other suitable metals or metallic oxides." When carbonates of the alkalis are desired, combining " a jet of carbonic acid with the " steam; or if chromates or stannates be desired," substituting " for the metals above alluded to chrome iron ore or oxide of " chromium, or tin stone or metallic tin as the case may be."

[Printed, 4*d*. No Drawings.]

A.D. 1863, January 14.—Nº 126.

JOHNSON, WILLIAM.—(*A communication from Thomas Macfarlane.*)—" Improvements in the manufacture of chlorine and " bleaching powder, carbonate of soda, and soda ash, and sul- " phate of iron." These are said to be the production of chlorine, the application and use of the residue from such production in the manufacture of carbonate of soda, the " use of the refractory " mixture of burnt lime and slag for forming the hearths of the " furnaces employed in smelting the mixture of sulphate of soda, " peroxide of iron, and charcoal." The " method of decolorising " the deep greenish colored alkaline solution " in " manufacturing " carbonate of soda and soda ash," the production of sulphate of iron from the artificial sulphuret of iron, and the combination of the processes, as follows :—Common crystallized green vitriol or sulphate of iron is dried without losing any sulphuric acid, and powdered and mixed in the proportion of " six hundredweight of " vitriol with four and a half hundredweight of common salt " (previously heated until it no longer decrepitates) and one and " a half hundredweight of per oxide of iron." These ingredients, in a state of fine powder, are introduced " into a muffle calcining " furnace of any convenient and suitable form " (one preferred is described) " on the hearth of the furnace previously heated to a " faint redness," by a fire in a grate underneath. " That part of " the furnace over the hearth which may be called the muffle, and " to which the flame or products of combustion of the fuel have " no access is connected with an exhausting machine." The air is drawn " through quicklime or other hygrometric substance," and passes " over the mixture which is spread out on the hearth " of the furnace. Double decomposition takes place," " sulphate

" of soda resulting on the one hand and protochloride and per-" chloride of iron on the other," and the oxygen of " the dry air " passing over the mixture, decomposes both into peroxide of iron, " which remains, and into chlorine gas," which is evolved and is drawn through an arrangement of purifiers and absorbing boxes, by means of exhausters, the former of which are vessels lined with lead and containing moistened pieces of coke. The absorbing boxes are of wood, containing four tiers of wooden trays or drawers with perforated bottoms and filled with slaked lime for absorbing the chlorine. When the chlorine is all evolved, the residue is raked into a chamber in front of the furnace. This residue of sulphate of soda and peroxide of iron, "weighing about one " thousand one hundred pounds," is mixed with two hundred and fourteen pounds of powdered coal or charcoal, " and smelted " in a reverberatory smelting furnace of any suitable construction, but one preferred is described. " Before the furnace is heated up " the hearth is prepared " as follows:—" One hundred pounds of " quick lime ground to powder are mixed with sixteen parts of " basic slag," or " glass not too difficult of fusion." This mixture is well beaten into the bottom in a dry state, the hearth scooped out in it, and a taphole formed through it at the bottom; the furnace is then heated gradually, and " a strong heat continued " until the materials of the hearth slightly cake together," when a mixture of " one hundred parts of sulphate of soda and twenty-" five parts of powdered coal or charcoal is introduced, and the " introduction thereof is continued until no more of the resulting " sulphuret of sodium is absorbed by the hearth." "The furnace " is then kept at a red heat, and is ready to receive the mixture " of sulphate of soda, peroxide of iron, and charcoal or coal." " Very soon after its introduction it begins to fuse, and emits " jets of yellow flame; after it has been properly stirred up, it " enters into quiet fusion and is let off at the taphole," and " run " into iron moulds." The material from the moulds " is broken " up and introduced into a boiler similar to that used for evapo-" rating alkaline solutions in the ordinary method of manufac-" turing soda, and in which the flame and products of combustion " pass over the surface of the solution." When the material begins to dissolve " the solution assumes a deep greenish black colour " from dissolved sulphuret of iron. When, however, heat is " applied to the solution, and the flame as well as the carbonic " acid produced by the combustion of the fuel is passed over it, the

" latter gas is absorbed, the solution gradually becomes decolo-" rised, and consists almost solely of a solution of carbonate of " soda." The sulphuret of iron undissolved is washed repeatedly with water, and "while in a moist state is exposed in considerable " quantities, but with as much surface exposed as possible to the " action of the atmosphere, and of moisture. It is laid on a " perforated wooden floor covered with coarse cloth," and so " arranged that the solution obtained in lixiviating the mass may " be conveniently collected for further treatment. The moist " sulphuret rapidly oxidizes, passing through various interme-" diate stages of oxidation it ultimately becomes very rich in " sulphate of iron," hot water dissolves out the sulphate. It is collected in canals prepared for it, and finally evaporated and crystallized.

[Printed, 1s. Drawing.]

A.D. 1863, January 19.—Nº 162.

BROOMAN, Richard Archibald.—(*A communication from Germain Adolphe Thibierge.*)—" Improvements in the manufac-" ture of sulphate of soda for conversion into soda and other " uses." These are, "1,000 parts by weight of fuel," "coal or " peat" preferred; "500 parts" of "natural or artificial sul-" phuret of iron," and "200 parts of salt," are all ground and made into a paste with water, and " the whole is moulded or " compressed into blocks," which are dried in piles, leaving a space at the bottom to ignite them. "Combustion proceeds " slowly." The " gases before entering the chimney should be " made to pass through a condensing chamber wherein ammo-" niacal salts would become deposited, and even after issuing " from the condensing chamber acid gases and chlorides may be " gathered in suitable apparatus." The residue is "sulphate of " soda" "mixed with a considerable quantity of oxide of iron " and with chlorides of iron and of sodium; 200 parts by weight " of this product mixed with 40 parts of a carbonaceous com-" bustible matter yield in soda ovens soda of a high character, " mixed with sulphuret of iron and chloride of sodium." "When " the sulphate of soda is to be separated" before being converted into soda the residue is lixiviated with water, the solution evaporated, drawn off, and crystallized, but no claim is made to this part of the process.

[Printed, 4d. No Drawings.]

A.D. 1863, February 13.—N° 395.

SCHLUMBERGER, Jules Albert. —(*A communication from Jean Jaques Müller.*)—"Improvements in treating coal tar, dead "oils, and for producing phenic or carbolic acid." These are as follows:—The dead oil is allowed to stand for a few weeks until the naphthaline has separated by crystallization, and afterwards agitated with milk of lime in certain proportions until the lime is all dissolved. After resting for two or three days the phenate of lime is separated and saturated by an acid, in preference muriatic acid, and the phenic acid distilled. "A second distillation will "produce crystallized phenic acid."

[Printed, 4*d*. No Drawings.]

A.D. 1863, February 25.—N° 521.

READMAN, William.—"Improvements in the manufacture of "carbonate of magnesia, and of iodine and kelp salt, and other "products from kelp." These are as follows:—The mother liquors from kelp, as also the salts crystallized from the same, are, it is stated, "found to contain a considerable quantity of carbonate "of soda," and it is proposed here to treat "the ley or a solution "of salts containing the carbonate derived from the kelp" with a "solution of chloride of magnesium, the products from which are "carbonate of magnesia and chloride of sodium. If in any case "the carbonate contained in the ley or in the solution of salts "from the ley should be deemed not sufficiently strong of itself a "portion of soda ash or other suitable carbonate may be added." Carbonate of magnesia precipitates, and the solution and washings are evaporated, "and the salts of soda and potash, as well as "iodine and bromine, are recovered in the ordinary manner."

[Printed, 4*d*. No Drawings.]

A.D. 1863, February 26.—N° 543.

SPENCE, Peter.—(*Provisional protection only.*)—"Improvements in the manufacture of potash, alum, and other salts of "potash." These are "manufacturing potash alum, and chloride of potassium, and sulphate of potash" from shales of the coal measures. By calcining them, as is described in N° 10,970, digesting them in dilute sulphuric acid "until the greater part of "the potash and sufficient alumina is taken up, when the solution "may be evaporated if desired" for crystals of alum. "To

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[Printed, 4d. No Drawings.]

A.D. 1863, February 25.—Nº [illegible]

MAN, WILLIAM.—"Improvements [illegible]
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" manufacture chloride of potassium or sulphate of potash " the calcined shales are covered with hydrochloric or sulphuric acid, and heated if desired. " The solution is then boiled down to " dryness, and the residue exposed to heat, after which the potash " salts are washed out and may be crystallized."

[Printed, 4*d.* No Drawings.]

A.D. 1863, February 26.—Nº 546.

HUMBY, James.—(*A communication from Heinrich Felsch.*)—(*Provisional protection only.*)—" Improvements in furnaces and " aparatus for manufacturing oxide of zinc or zinc white." These are, in constructing a muffle furnace placing the crucibles one upon another in such manner that they cannot bend or burst; " these crucibles are to be fed with metallic zinc in cakes." " During the operation of obtaining the oxide concretions " become formed around the mouths of the crucibles; these " concretions are coarse, and are drawn down through spaces " into receptacles below the muffle; above the muffles are receptacles for the oxide. " The portion of first quality oxide which does not " reach " the receptacles above the muffles falls back through spaces into receptacles below the muffles and separate from those for the concretions. There are valves in the passages connecting the muffles with the receivers above " for the purpose of closing " the passage into the chamber during the charging of the " crucibles with metal, or of preventing the passage of flame or " dirt into the chambers during the charging of the crucibles or " on any other contingency."

[Printed, 8*d.* Drawing.]

A.D. 1863, March 2.—Nº 584.

GARTON, Charles.—" An improved method of applying heat " in the manufacture and refining of sugar, and in malting, hop " drying, brewing, distilling, and vinegar making." This " consists in employing hot water or other fluid as the heating " medium " by connecting " a chamber or coil of pipes, or a series " of such (fixed at the place or places where the heat is required " to be applied), with a boiler by means of flow and return pipes, " the former entering the chambers or coils and boiler at a higher " level than the latter, and in the case of chambers being used, " the same being fitted with partitions extending nearly through

" their entire width, and at the highest point thereof, with pipes " to allow the escape of air," filling " the whole with water or " other fluid," and applying " fire to heat the boiler, which will " cause the fluid to circulate through the pipes and chambers or " coils and boiler, whereby the same degree of heat will be uni- " formly communicated to the chambers or coils and their sur- " faces, as is contained in the boiler in direct contact with the " fire," which uniformity is lessened and regulated " at will by " means of stop cocks attached to the flow and return pipes." " In applying this heating medium to kilns for malt or hops," a space is left "between the perforated floor of the kiln and the " chamber or coil," and shafts from the open air are conducted into such space, " by which a current of air, naturally or artificially " created, may be conveyed thereto, and the heated air contained " therein be forced through the kiln."

[Printed, 10*d*. Drawing.]

A.D. 1863, March 4.—N° 611.

CLARK, William. — (*A communication from Louis Désiré Verstraet and Charles Schmid.*)—" Improvements in the manu- " facture of sulphuric acid, and in apparatus for the same." These are, the application of the chemical principle of using coke or other porous bodies to facilitate the combination of the gases and vapours, also in the general arrangement of the apparatus, and the peculiar form of a tube, " for condensing the arsenious " and selenious acids, and collecting the dust," together with " the application of stoneware chambers superposed, or other " apparatus serving the same purpose." The sulphurous acid is evolved from burning of sulphur or of iron or copper pyrites in a furnace, while nitrate of soda is decomposed in another. The gases pass through iron pipes into a " central brick chimney," and thence into and through a large upright cast-iron pipe into a horizontal large leaden pipe dipping into a bath filled with water. On its exit from this tube the gas passes through a long bent pipe having at its lower part a cock for drawing off the condensed liquid. The lower part, which is much larger than the upper part, dips into a bath filled with water, " to cool the gas and " retain any dust and arsenious and silenious acids ordinarily " contained in pyrites ;" at the bottom is a small leaden trap to remove impurities. On leaving this bent tube, " the gases pass

" into a stone pipe in communication with a chamber three-" fourths filled" with coke well washed and calcined. The vapors pass through four or five series of chambers, all filled with coke; the lower series of chambers are each furnished with a cock, through which the condensed sulphuric acid passes into leaden baths below, and is forced by air or steam pressure into the apparatus nearer to the furnace in order to give it greater density; a jet of steam is also injected into the chambers.

[Printed, 1s. Drawings.]

A.D. 1863, March 6.—Nº 638.

BOUSFIELD, George Tomlinson.—(*A communication from William Elmer.*)—" Improvements in the manufacture of illu-" minating gas, and in apparatus employed therein." These are, first, " the manufacture of illuminating gas by decomposing " fluid hydrocarbons in the presence of hydrogen previously pre-" pared for the purpose, the hydrogen being supplied in the " proper relative quantity to combine to form olefiant gas with " the products of the decomposition of the hydrocarbons."

Second. Apparatus for working out the above.

Third. " The employment of zinc in the retort in which water " is decomposed."

Fourth. " The combination of the retort for the decomposition " of water with the retort for the formation of illuminating gas " through the intervention of a condenser."

Fifth. " The combination of a heating apparatus," " so as to " heat steam previous to its decomposition."

Sixth. " The combination of a heating apparatus," so as to " heat the hydrogen previous to its introduction into the retort " in which the illuminating gas is to be formed."

A lower retort, called the hydrogen retort, is connected with an upper retort called the hydrocarbon retort. A condenser, consisting of a series of cells, is interposed between these retorts; the hydrogen passes from the condenser to the hydrocarbon retort through a pipe which is highly heated. " The hydrogen retort " should be kept at a temperature just high enough to vaporize " a sufficient quantity of the zinc to decompose the water, and " this temperature may be regulated by varying the admission of " air to the ash-pit of the furnace by means of a register." " The " products of the decomposition of water by commercial zinc

" are hydrogen, oxide of zinc, and some immaterial traces of " other substances; the larger quantity of oxide of zinc remains " in the hydrogen retort, and is removed previous to supplying " a new charge of zinc, a portion is, however, found in the " condenser. The oxide is collected and washed to fit it for " market."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1863, March 12.—N° 679.

POLKINGHORNE, JAMES.—" Improvements in treating tin " ores, and in treating ores, and in apparatus for treating ores " and matters containing arsenic." These are, in reference to this subject, " treating ores and other matters containing arsenic, " in order to obtain arsenic therefrom." The apparatus " con- " sists of a furnace surrounded by flues, with an outlet leading from the furnace into a chamber for collecting the gases. " The " ores or matters are fed into the retort through doors made for " the purpose, or through shoots leading into and through the " roof or upper part of the retort; a pipe is carried through and " into the upper part of the retort, through which the arsenious " gases are led into the usual poison chambers or flues."

[Printed, 4*d.* No Drawings.]

A.D. 1863, March 18.—N° 731.

LORBERG, WILLIAM.—(*Provisional protection only.*)—" Im- " provements in the treatment of rags, and obtaining valuable " chemical products from the animal fibre therein." These are, in mixed, woollen, and cotton, and other goods, steeping them in " a solution of caustic alkali, soda or potash, which disintegrates " or dissolves out the animal fibre, such as wool, silk, hair, with- " out sensibly attacking the vegetable fibre." This solution also breaks up some of the " colours or dies, and removes most of the " dirt and other impurities contained in the rags." " The action " takes place in the cold, but heat accelerates it. After this pro- " cess the goods are subjected to strong pressure, and afterwards " thoroughly washed in cold water, then acidified in a bath with " five per cent. acid, and again washed and bleached." The spent liquor from the first process, containing the wool and other animal matters in solution, and being therefore very rich in nitrogen, "is employed for the manufacture of manure, ammonia, " or cyanogen compounds."

[Printed, 4*d*. No Drawings.]

A.D. 1863, March 18.—N° 732.

MOREL, AUGUSTE.—" Improvements in apparatus for gene- " rating carbonic acid." These are, two vessels are placed above " or near each other, and " made of lead, enamelled iron, or " other suitable metal, the thickness of which is in proportion to " the pressure to be obtained. The interior surface is lined with " gutta percha or other coating, which protects it from the corro- " sive action of the acids." The lower vessel contains the carbonate (marble), the upper vessel contains the supply of acid, in preference hydrochloric acid. The chambers communicate with each other by means of a bent pipe coming out of the top of the lower vessel and entering the top of the upper vessel, and passing nearly to the bottom of the same. The gas produced in the lower chamber passes off by a pipe near the top, nearly to the bottom of a washing chamber, and is conducted where required by a pipe from the top of this chamber. A supplementary reservoir of acid is used for putting the apparatus in motion by means of a pipe, into the upper part of the lower vessel, and by pouring a little acid into it " carbonic acid will immediately form, which expands in " the first chamber, and second vessel or chamber, and into a " washing chamber, and to limit the pressure a valve is placed " on the second vessel, but this has many disadvantages with " pressures of gaseous nature, the valve opens badly and does " not close sufficiently tight to retain the gas ; " to obviate this a bent pipe is connected with the second vessel, this dips into a small reservoir which communicates with a long pipe in communication with a small reservoir. The length of the above pipe is " in proportion to the pressure to be obtained," and the small " reservoir being full of water when the gas is produced, it raises " the water in the pipe, and if the pressure becomes greater than " was intended," the water in the small reservoir and in the pipe is forced into a vessel at the top of the long pipe, and " the gas " in excess escapes until the pressure returns to its normal " condition."

[Printed, 1*s*. Drawings.]

A.D. 1863, April 4.—N° 863.

SPENCE, PETER.—(*Provisional protection only.*)—" Improvements in the manufacture of sulphuric acid and sulphate of " iron." These are, causing the waste vapour arising from the manufacture of sulphuric acid " to pass through masses of " metallic iron in the condition of porous cakes, whereby the said " gases are absorbed and sulphate of iron is consequently produced." The iron is obtained as above, " by submitting its " oxide or ores to heat, so as to reduce it without fusion." It is also proposed to use this finely divided metal " for the manufacture of sulphate of iron apart from the manufacture of " sulphuric acid."

[Printed, 4*d*. No Drawing.]

A.D. 1863, April 7.—N° 878.

BROOMAN, RICHARD ARCHIBALD.—(*A communication from Julien Gabriel Lelong Burnet.*)—" Improvements in the manufacture of baryta, and its derivatives, in obtaining by-products, " and in revivifying or recovering certain agents employed in " such manufacture." These are, first, " preparation of baryta," native sulphate of baryta, is mixed " with from 10 to 15 per cent., " more or less, of mineral or vegetable coal," and calcined in a retort; " to facilitate the decomposition, vapour from tar, or other " carburetted gases may be made to pass into the retorts." The result is lixiviated with water, a solution of " oxysulphuret of " barium " is obtained, and the residuum treated " with hydrochloric or azotic (nitric) acid," " yields chloride of barium or " azotate (nitrate) of baryta." The solution of oxysulphuret of barium is treated with potash or soda, by which " a solution of " baryta and sulphuret of potassium or of sodium " are obtained; " the baryta crystallizes in the body of the liquor, and the sulphuret obtained may be transformed into hyposulphite of potass " or soda by a current of sulphurous acid." Sometimes passing a current of carbonic acid through the sulphurets, and producing the carbonates of these compounds; the hydrosulphuric acid evolved is applicable to the manufacture of sulphuric acid, sulpurous acid. Or freeing them from sulphur by a metallic oxide, as of " lead, zinc, copper, iron, manganese, antimony, bismuth, " and tin. Oxide of magnesium may be added to this list, but

" as it produces a soluble sulphuret," the baryta is separated by crystallization, " instead of decanting, as when the other oxides " named are employed." The oxides of copper and zinc are preferred, and heat is advantageous. The metallic sulphuret is revivified by roasting, and the sulphurous acid is converted into " sulphuric acid, or used for making sulphites or hyposulphites." The sulphuret it is said is difficult to free from the baryta, and instructions are given to effect this. When oxide of zinc is used baryta adhears more to it, and after a certain number of roastings, the result is " a mixture of oxide of zinc and carbonate of " baryta," which " may be employed in glass making." " If in " commencing " the manufacture, " native carbonate of baryta " is used instead of sulphate, as it contains a little sulphate " which becomes converted into sulphuret," the solution is treated " by the oxides before named." " The crystals of baryta " are delivered into commerce," or heated to " obtain mono-" hydrated baryta." Anhydrous baryta is obtained by mixing together " sulphate of baryta, sulphuret of barium, and about ' ten per cent. of magnesia," and calcining " them out of the " air," crystals are obtained by dissolving this in water. Nitrate of baryta is decomposed by heat into anhydrous baryta, the nitrous gases evolved are brought into contact with " native " carbonate of baryta, pounded or mixed in the state of powder " with water."

Second. In treating the solution of sulphuret of barium, by carbonate of potash or soda, or by carbonic acid, the precipitate is carbonate of baryta, with more or less of sulphur, the precipitate may be digested with caustic potash or soda, " by sulphuret " of carbon, benzine, or hydrocarburets of light density," to dissolve the sulphur. " The dissolving matter evaporated, yields " the sulphur it had dissolved." The carbonate mixed with sulphur is collected, " washed, and placed in a close vessel, in which " it is heated by passing into it a current of the following gases, " alone or mixed:"—Carbonic oxide, hydrogen, carburetted hydrogen, coal gas, " gas derived from a hydrocarburet in a state " of vapour," " vapour of water alone superheated, or vapour " from water decomposed by incandescent coal," " carbonic oxide, " and generally all gases and vapours deprived of oxygen." Again, the carbonate mixed with sulphur, after washing, is " mixed with coal, tarry matters, oils, and the like, and the whole

" may be heated in a closed vessel; among other products, sul-" phuret of carbon is disengaged, and may be collected and used " in the wet process," above. Carbonate of potash or soda added to a solution of hydrate of baryta, carbonate of baryta precipitates, and a solution of the caustic alkali employed results, and is concentrated " for commercial uses." Native carbonate of baryta is suspended in water, and carbonic acid is passed into it under pressure, a solution of bicarbonate is obtained, and to which water of baryta is added, carbonate of baryta precipitates and is dried. To remove traces of sulpbur from barytic solutions, employing free chlorine or " hypochlorite of baryta, by causing chlorine to " be absorbed in a solution of baryta," but free chlorine is preferred; " alkaline and alkaline-terrous hypochlorites may also be " employed with advantage."

Third. Precipitated sulphate of baryta is obtained by processes " completely analogous to those just described for the carbonate, " they therefore require no farther description."

Fourth. Obtaining " azotate (nitrate) and chloride of barium by " treating sulphuret of barium directly with azotic (nitric) or " hydrochloric acids," sulphuretted hydrogen is evolved and is burnt to convert it into sulphurous acid, which is again brought into contact " in a suitable apparatus with sulphuretted hydrogen " produced in a second vessel at the same time," sulphur is deposited. These salts are also produced by treating the residium of sulphuret by nitric or hydrochloric acids.

Fifth. Obtaining aluminate of baryta, first, by calcining " a " mixture of native sulphate of baryta and of pure or ferruginous " alumina in about equal proportions;" the residue is boiled, and filtered gives " a solution of aluminate of baryta." Second, " by " submitting the previous mixture, with the addition of about " five per cent. of coal, to a cherry-red heat and introducing a " current of steam." Third, " by submitting to the same treatment " a mixture of sulphuret of barium and aluminous earth in about " equal proportions, or a mixture of sulphuret of barium and of " sulphate of alumina." Fourth, by " submitting to the same " treatment a mixture of chloride of barium and of aluminous " compounds in about equal proportions," the steam liberates " hydrochloric acid, which is collected and acted upon by car-" bonate of lime to form chloride of calcium and carbonic acid." " In the second and third processes the steam carries off sulphurous

" compounds," "which yield a liquor holding sulphur in suspen-" sion."

Sixth. "By pouring carbonate of soda into the aluminate of " baryta until precipitation ceases" "pure carbonate of baryta " and pure aluminate of soda" are obtained.

Seventh. "Causing sulphuric acid or sulphate of soda to act on " the aluminate of baryta until precipitation ceases," "a preci-" pitate of pure sulphate of baryta and alumina or aluminate of " soda" are obtained.

Eighth. "Acting upon aluminate of baryta with quick lime, an " insoluble aluminate of lime is formed, and the filtered or " decanted liquor is a solution of baryta, which by concentration " and calcination becomes monohydrated baryta."

"In the employment of steam in the actions or processes before " described, the mixtures reduced to a firm paste, and formed into " lumps about the size of cob nuts, are placed in vertical or " inclined retorts, in order that a constant current of steam may " pass through the mass."

[Printed, 6*d*. No Drawings.]

A.D. 1863, April 16.—Nº 956.

BAGGS, Isham, and **SIMPSON**, William.—"Improvements " in purifying and treating coal gas, sulphuretted hydrogen, and " other gases containing sulphuretted hydrogen, and in obtaining " sulphur, sulphuric, and other acids in such treatment." These are, "the employment of metallic salts and oxides or bases," as follows:—First, by passing the gases through or in contact with, as an example, "a solution of sulphate of copper or sulphate of " copper and oxide mixed, the oxide maintained in suspension " by constant agitation," sulphide of copper is formed, and " roasted with excess of air produces either sulphate of copper " again or oxide, or a mixture of the two, according to the heat " employed or the time consumed." "Other salts of similar " power may be used in a similar way." "To abstract the car-" bonic acid from coal gas" it is passed "through water contain-" ing a metallic oxide in suspension; oxide of zinc, copper, or " other metal will answer the purpose. When the oxide is satu-" rated with gas the latter is driven off, and the oxide recovered " by exposing the carbonate so produced to a red heat." "In " some cases" magnesia is used "for this purpose."

Second. "Exposing the cleansing materials above named and "referred to in a state of powder, formed into a porous mass" by mixture with breeze, pumicestone, &c. "the gas being caused to "permeate or filtrate through the mass." Gases containing sulphuretted hydrogen are passed "through a sulphate in a state "of solution or suspended in water or otherwise," preferring "anhydrous sulphate of copper." "Sulphur becomes precipitated "when the gas containing sulphuretted hydrogen is passed into "a solution of a metallic supersalt, as for instance, persulphate "of iron." Nitric and acetic acids are obtained when nitrates and acetates are employed to "act upon the sulphuretted hydrogen." "Insoluble metallic salts, such as sulphate of lead, when "used in this way, should be employed in a state of mixture with "water or as a thin paste, or, finally, in a moistened state, upon "the shelves of a dry lime purifier." The sulphide is separated by "subsidence or filtration from the liquid portion of the products," and washed or otherwise, is calcined "for two or three "hours or more till oxidation has more or less completely restored "them to their original condition, and rendered them fit for the "purification of further portions of gas." The liquid or soluble portions are "boiled down or concentrated in order to obtain the "valuable acids or the salts of ammonia produced in the process." "The method of recovery here described may be repeated ad "infinitum."

[Printed, 4*d*. No Drawings.]

A.D. 1863, April 17.—N° 967.

CLAPHAM, Robert Calvert.—"Treating the waste liquors "from bleaching powder stills in order to obtain hydrochloric "acid and other products therefrom." This consists as follows:— First. Distilling these liquors in a furnace or retort; in either case "the vapors or gases, which consist of hydrochloric acid and "steam," are "passed through pipes, which may be cooled by "water, or by air, or otherwise." The hydrochloric acid obtained "generally averages about 15° Twaddle." This acid is "applied "in the place of water for muriatic acid condensers, according to "the plan recommended for the use of weak muriatic acids" in N° 2193, 1860, and "by this means obtaining commercial hydro-"chloric acid suitable for the manufacture of bleaching powder "or other purposes," or adding "ground manganese to the solu-

" tion in the furnace or retorts," and "after heating a suitable " time," obtaining chlorine; "the residue in the furnace or " retort can be used as a deodorizer to purify sewage or for the " separation of sulphur from coal gas."

Second. The residue " may be decomposed with lime, magnesia, soda waste, or any of the earths or alkalies," and the soluble chloride washed from the oxide of manganese "and the latter " applied as fettling in pudling furnaces, or for the extraction of " the metals of manganese and iron in a blast furnace; or the " manganese may be further oxidized and used for the same pur-" purposes. The chlorides of calcium and magnesium may be " separated and used;" or " the chloride of magnesium may be decomposed by heat and the hydrochloric acid condensed," and the magnesia " digested with sulphuric acid to produce Epsom " salts."

Third. The residue may be mixed with the earths or alkalies as above, and applied directly " as fettling " for puddling or other furnaces, without being previously washed.

Fourth. " Or the still liquors, either before or after separating a " large portion of the free hydrochloric acid, may be mixed with " burnt pyrites, by which the sulphur in the burnt pyrites, or " part thereof, is expelled, and the mixture may be also applied as " above."

Fifth. Or the still liquors, as under the fourth head, are added to soda waste which has "passed through the process known as " Losh's Patent process " (exposed sufficiently to convert the sulphuret into sulphite of lime), and " either before or after further " exposure to the atmosphere, and after digesting it in suitable " apparatus," obtaining " sulphurous acid suitable for commercial " purposes."

[Printed, 4*d*. No Drawings.]

A.D. 1863, April 23.—N° 1012.

RICHARDSON, Thomas, and STEVENSON, James Cochran.—" Improvements in the manufacture of sulphate of soda." These are, heating the " salt used in the manufacture of sulphate " of soda previous to its being mixed with sulphuric acid in the " decomposing furnace." " When using heated acid the salt " may be employed at a temperature of 250° F., and when the " acid is used cold the salt may be heated to 400° F." In order

" to prevent evaporation of the sulphuric acid" "the temperature " of the heated salt must not exceed the boiling point of the sulphuric acid employed." When rock salt is used it is ground fine and it is preferred " to heat it after it is ground."

[Printed, 4*d*. No Drawings.]

A.D. 1863, April 27.—N° 1053.

BENNETT, Frederick.—" An improved method of condensing " lead and other metallic fumes and vapours from furnaces." This consists in condensing the " metallic fumes of lead, copper, " and other ores and minerals, also noxious smoke and gases, " salts, acids, and other vapours volatilized from smelting and " other furnaces," by " causing them to be drawn from the flue " into a chamber containing water, and mixed with the water by " means of a wheel or screw blades," on " the principle of the " archimedean screw, or any other form of wheel, with vanes or " floats in the main flue or in a separate chamber," and causing a constant supply of water to be maintained at such a level in the chamber that the ends or more of the vanes may be immersed, " imparting rapid rotatory motion to the wheel when the metallic " fumes and other products are drawn and thrown to the periphery; the vanes at the same time throw a constant spray or " quantity of water, which mingling with the fumes and other " products condenses them. Should perfect condensation not be " effected by one wheel a second wheel or more may be employed " in the same flue or chamber, or in similar flue or chambers, and " the process repeated over and over again until entire condensation is secured." Under some circumstances impregnating " the water with the soluble chlorides or carbonates for the purpose of assisting condensation by chemical combination." In addition to the above a condensing chamber may be used partially " filled with water, or coke kept saturated with water, through " which the metallic fumes and other products may be drawn by " the draught or suction of the wheel."

[Printed, 10*d*. Drawing.]

A.D. 1863, April 30.—N° 1089.

CLARK, William.—(*A communication from Louis Joseph Frédéric Margueritte.*)—" Improvements in the manufacture of " hydrocyanate of ammonia and of alkaline or earthy cyanides."

These are said to be, first, "the reaction at a red heat of ammo-" niacal gas on soot or lamp black, or perfectly carburetted " hydrogens, or other matters producing at a high temperature " carbon in a nascent state."

Second, "the production of hydrocyanate of ammonia, and its " transformation into cyanide, with a base of lime, potash, soda, " or of metallic oxide."

Third, "the simultaneous passage of the ammonia, carburetted " hydrogen, or naphthaline, over a mixture of charcoal and alka-" line carbonate heated to redness."

Fourth, "the method of producing the carbon necessary for the " formation of the cyanogen in a nascent state, and in intimate " mixture with the ammonia, by the decomposition of a hydro-" carburet or other matter capable of producing carburetted " vapours."

A retort of small diameter is first filled with fragments of porcelain, &c., or preferably charcoal, pounded and calcined; at the cool part of the mouth of this retort the ammoniacal gas enters, and "a jet of napthaline is introduced, which becoming vaporized " mixes with the volatile alkali, and with it simultaneously " traverses the fragments heated to redness, that is, at a tempera-" ture at which the napthaline decomposes and deposits its " carbon;" hydrocyanate of ammonia is formed, and "is received " in a lye of potash or caustic soda which frees the ammonia and " produces an alkaline cyanide," which "is boiled with iron " filings in order to form ferrocyanide," and then evaporated to crystallization. "Instead of napthaline" employing "other car-" buretted hydrogens."

[Printed, 4*d*. No Drawings.]

AD. 1863, May 5.—N° 1116.

WALSH, William.—"Improvements in obtaining and purifying " oxalate of soda, which improvements are also applicable to the " manufacture of oxalic acid." These are "submitting woody " fibre or other organic substances to the action of caustic soda " alone." "Dry or solid caustic soda, containing from 60 to 70 " per cent. of caustic alkali," is submitted "to a temperature of " from 450° to 800° Fahrenheit, in a crucible or cast-iron vessel," by which it is fused, and it is removed "to another vessel, and the " woody fibre or other organic substances placed in it and agitated

" by hand or machine," forms "a pulp which is a crude oxalate " of soda," and "contains twenty to thirty per cent. of oxalate, " which is purified and converted into oxalic acid in the ordinary " manner."

[Printed, 4*d*. No Drawings.]

A.D. 1863, May 13.—Nº 1205.

HEUSNER, Karl Ludwig.—(*Provisional protection only.*)— " Improvements in the manufacture of hydrate of barytes and in " the manufacture of sugar." These are, "carbonate of barytes " is decomposed by subjecting it, mixed with coal or charcoal and " a small quantity of a suitable flux," (preferring an alkali or alkaline earth,) "in an air or reverberatory furnace commencing " with about 800° of F., and raising the temperature up to a white " heat," when it is drawn and cooled in the air, slaked gradually with water, and afterwards "dissolved in water, and the solution " after being allowed to settle for a time is fit to be employed in " the manufacture of sugar." If the hydrate is required for transportation to a distance, "the solution is evaporated to dry-" ness, and when about to be used it is again to be dissolved." " In order to obtain sugar from molasses, treacle, and other sac-" charine fluids, a solution of hydrate of barytes is mixed there-" with," and the precipitate obtained is mixed with water and decomposed by carbonic acid gas; carbonate of barytes precipitates, leaving "a syrup suitable to be treated in the ordinary " manner to obtain crystals of sugar therefrom."

[Printed, 4*d*. No Drawings.]

A.D. 1863, May 28.—Nº 1342.

RICHARDSON, Thomas, and IRVINE, Robert.—"Improve-" ments in treating the waste liquor obtained in the preparation " of esparto grass." These are, first, boiling down the waste liquor obtained in the usual mode of preparing esparto grass, with carbonate of lime or magnesia, or any metallic oxide, to dryness. These substances are added in equivalent quantities, and the residue is balled "as practised in alkali works."

Second. "lixiviating the black balls, obtained as above de-" scribed, in the usual way, and employing the resulting liquor for " treating fresh quanties of esparto grass in lieu of using fresh " alkali."

[Printed, 4*d*. No Drawings.]

A.D. 1863, July 1.—N° 1638.

CLAPHAM, Robert Calvert.—(*Provisional protection only.*)—"Improvements in the manufacture of hyposulphite of soda, "sulphite of soda, and sulphate of lime." These are, taking "soda waste or other sulphurets, which may be first exposed to "the air sufficiently long to be partly oxidized, or may be used "without any exposure to the atmosphere," and treating it "with "water of various degrees of heat, preferring a boiling heat," and to the solution obtained adding "sulphite of soda," and obtaining, after "digesting a suitable time, hyposulphite of soda in solu"tion and sulphite of lime as a precipitate." Sulphite of soda is obtained as follows:—Digesting "soda waste or other sulphurets "which have been exposed sufficiently long to the atmosphere to "be converted into sulphites," with a solution of carbonate of soda; "sulphite of soda is in the solution" which may be "applied as above or crystallized and used for commercial "purposes."

[Printed, 4*d*. No Drawings.]

A.D. 1863, July 8.—N° 1695.

ARMSTRONG, Henry.—(*Provisional protection only.*)—"Im"provements in the manufacture of alum." These are, evaporating "the crude liquors obtained in the usual way from the calcined "shales of Yorkshire and elsewhere in a suitable pan or furnace, "until they are of a viscid consistency," and then adding "a "sufficient quantity of finely sifted slaked lime, china clay, pipe"clay, or other aluminous substance, or both lime and aluminous "substance, until the free acid contained in the liquors is neutra"lized, or until the mixture when cold sets into a hard, firm mass. "When sufficient of the lime or aluminous substance or both has "been added, the mass is then removed from the pan or furnace "and allowed to cool." This compound is named "crude alum."

[Printed, 4*d*. No Drawings.]

A.D. 1863, July 10.—N° 1732.

STILLE, Ludwig.—(*Provisional protection refused.*)—"Improve"ments in the construction and arrangement of galvanic batteries, "and in the utilization of products resulting therefrom." The electric current "is produced, according to this invention, by the aid

" of zinc and gas coke, carbon, or graphite, or zinc and cast iron, " and zinc, or platina. A cylinder of gas coke, carbon, graphite " cast iron, or platina is placed inside a glass or other suitable jar " containing concentrated nitric acid, and a metallic ring or " other convenient connecting arrangement is fitted to its upper " edge, to which ring is attached the conducting wire, a second " wire being attached to the zinc element." "Within the cylinder " is placed a porous vessel or diaphragm (filled with a solution of " chloride of potassium or of saltpetre.)" "In this porous vessel " is placed the zinc element." "The outer jar containing all " these elements is closed by an air-tight cover provided with " three apertures, through two of which pass the conducting " wires, whilst through the third is introduced an exit pipe for " carrying off the gas." "When using a gas coke cylinder, it " will be advisable to impregnate it with bees-wax, in order to fill " up the pores." "When the boiling is exhausted, the resulting " products are removed from the jars and vessels. In the diaphragm a precipitate of basic nitrate or "chloride of zinc is " formed, according to the fluid employed, whilst in the outer jar " there is a fluid containing nitric acid, which acid may be recovered and economized as follows:—The entire contents of " the jar are collected and mixed, the acid remaining in solution " dissolves the precipitated zinc salts, and from this solution " carbonate of zinc is precipitated by means of carbonate of potash, " the resulting carbonate of zinc being separated and prepared " for use." The solution containing nitrate of potash is crystallized. Should chloride of potassium be employed in lieu of nitrate of potash, carbonate of soda is added, the carbonate of zinc precipitated is "prepared for use, and the nitrate of potash " and chloride of sodium in solution separated by evaporation " and crystallization as is well understood. The nitric acid is " regained by passing the gas generated whilst at work, in combination and admixture with atmospheric air, into or over water, " or the product may be obtained in any other suitable and well-" known manner."

[Printed, 4*d*. No Drawings.]

A.D. 1863, July 15.—N° 1776.

CLEMM, Doctor Christian Gustav.—" New employment " of magnesia and its combinations in manufactures." First, methods of manufacturing sulphuric acid. "Kieserit, a mineral "found in considerable masses in the salt mines of Stassfurth," is "an isomeric modification of sulphate of magnesia;" this is reduced to powder, then purified from the alkaline chlorides it may contain by washing with water, and compressed into balls, &c., which are calcined while steam is introduced among them. The sulphuric acid is liberated and condensed in leaden chambers, &c. "If the kieseret is mixed with a little charcoal it disengages "the sulphuric acid still more quickly, but part of it is thereby "decomposed into sulphurous acid." When common sulphate of magnesia is mixed with from 10 to 15°/₀ of charcoal, and "calcined in the same manner as kieseret," the gases are carbonic acid and sulphurous acid; the latter is condensed in the leaden chambers. Sulphuric acid is also made by means of different secondary products by means of sulphite of magnesia, which "salt readily "disengages at a moderate heat in furnaces or retorts hermetically closed its sulphurous acid," and by means of sulphuretted hydrogen gas, by burning it "after the method of Hunt," oxidizing "the sulphurous acid which results from its combustion by the "ordinary method in the leaden chambers."

Methods of making sulphate of potash and of soda and "the "double salts of these sulphates with the sulphate of magnesia, "hydrochloric acid, and magnesia." "Method of preparing "sulphate of soda and its double salt with the sulphate of "magnesia:"—2 equivalents of kieserit and 1 equivalent of common salt are mixed intimately together, or, better, the two substances are dissolved "in the least possible quantity of water "and mixed together and evaporated to a thick paste, and calcined in a muffle furnace under the influence of a current of "steam;" there is obtained the double salt ($Mg\ O\ SO_3 + Na\ O\ SO_3$), "and some magnesia and hydrochloric acid is disengaged." The furnaces used "are a combination of the muffle "furnace with the common reverberatory furnace." The mass after some calcination is pushed on to the second oven hearth. "Almost all the hydrochloric acid is disengaged from the muffle "furnace," and it is condensed "in the ordinary manner." To prepare pure Glauber's salt by means of this double salt there are two different ways, 1st, saturating "boiling water with the double "salt ($Na\ O\ SO_3 + Mg\ O\ SO_3$), and keep the solution for some "time in a boiling state." The Glauber salt separates in an anhydrous state as a fine crystalline powder. "The double salt

" ($Na\,O\,SO_3 + Mg\,O\,SO_3$) is dissolved with one equivalent of " sea salt in water. This salt, if the solution is carried by a " Carré's apparatus to a temperature of + 28 F., is decomposed " into sulphate of soda, which crystallizes, and chloride of mag- " nesium, which remains in solution." " The decomposition of " sea salt by kieserit, and consequently the formation of the " double salt ($Na\,O\,SO_3 + Mg\,O\,SO^3$), can also take place by " the humid way." Separating " the double salt ($Na\,O\,SO_3 + Mg\,O\,SO_3$) from chloride of magnesium by drying and crystallizing it. If " equal equivalents of sea salt and kieserit" be dissolved " in the least quantity possible of boiling water," and this solution exposed " to a temperature of + 24·8 F. by means of Carré's apparatus almost all the soda precipitates in the state of Glauber's salt crystallized very pure. The chloride of magnesium remains in solution with some small quantities of chloride of sodium and sulphate of magnesia. This solution " is employed " in the preparation of hydrochloric acid free from sulphuric;" for this purpose it is calcined and submitted to the action of steam. " A part of the chloride of magnesium is prepared in a " dry state, and will be brought into commerce under the deno- " mination ' solid hydrochloric acid.' "

" Preparing sulphate of potash and its double salt with the " sulphate of magnesia." If a " solution of kieserit in chloride " of potassium " be submitted " to a steam pressure of 10 at- " mospheres, all the potash is precipitated in the condition of " sulphate free from water." If there is mixed " with a solution " of sulphate of potash or of the double salt ($K\,O\,SO_3 +$ " $Mg\,O\,SO_3$)," one equivalent of chloride of sodium for each equivalent of sulphuric acid contained in the solution, and afterwards the mixture carried to " a temperature of 0° to 4° F. by means " of a Carré's apparatus, the sulphate of potash is transformed into " chloride of potassium, which remains in solution, and into sul- " phate of soda (with 10 HO). The mother water is but a solution " of artificial carnallit." If only one equivalent of chloride of sodium be added to a solution of the double salt ($K\,O\,SO_3 + Mg\,O\,SO_3$) it will " require but a cooling to 40° F. to transform " the sulphate of magnesia into Glauber salt."

" Method of manufacturing soda and potash:"—" To the " mixture of magnesia and of sulphate of soda or of sulphate of " soda and sulphate of magnesia, as it comes from the decom

" posing furnace (sulphate furnace), 24 to 30 per cent. of charcoal " or coking coal (with the least quantity possible of ash) reduced " into a fine powder " are added, and the mass is calcined in a reverberatory furnace. During the calcining sulphurous acid is given off and is brought " into contact with milk of magnesia and " forms sulphite of magnesia." The calcined mass " contains " some sulphuret of sodium, magnesia, some carbonate of soda, " and charcoal;" this mixture is called " the cast." These casts are exposed in chambers to " a methodical carbonization, so that " the carbonic acid which escapes from the first chambers mixed " with sulphuretted hydrogen (H, S) is completely absorbed in the " latter. During this time the casts are frequently watered." The carbonic acid is also moist. The sulphuretted hydrogen slowly evolved is absorbed, and " neutral carbonate of magnesia and bi- " carbonate of soda " are formed. The mass is finally heated to 570° F., and is " free from sulphur and hyposulphites," and is " composed of a rich soda and very pure magnesia with a little " charcoal," and heated with boiling water " or steam in order to " give a highly concentrated solution of soda and a residuum of " magnesia." Carbonate of magnesia is prepared pure by " passing over the residuum of magnesia, after its being washed in " lye, the air in a stove;" this is named " solid carbonic acid." The carbonic acid is obtained for the carbonization of the cast by heating the above carbonate in a muffled furnace.

" Process for preparing sulphur:"—Decomposing " the sulphuretted hydrogen gas obtained as a secondary product of the " manufacture of soda by sulphurous acid according to the known " methods of Persoz and Favre," thus obtaining " in a pure state " the sulphur from the sulphuretted hydrogen gas as well as " that of sulphurous acid." Also decomposing " sulphuretted " hydrogen gas according to Wagner's method by means of sesqui- " chloride of iron."

" Method of preparing sulphate of magnesia:"—Treating " at " a temperature of 122° to 158° F. gypsum powdered very minutely, and suspended in water with neutral carbonate of " magnesia ($Mg\ O\ CO_2 + 3\ HO$) by stirring continually. A " solution of sulphate of magnesia and a residuum of carbonate " of lime are thus formed."

Chloride of magnesium found in the rubbish salts of Stassfurth and also washed kieserit, which is named solid sulphuric acid, have their acids expelled by means of heating them in steam, and the acids are directed on to the ores, or the acids are condensed and used in a liquid form for the extraction of ores.

[Printed, 10*d*. No Drawings.]

A.D. 1863, July 25.—N° 1860.

CROCKFORD, Charles.—(*Provisional protection only.*)—" Improvements in the treatment and utilization of certain of the " waste products from the manufacture of alkali and bleaching " powder, and also from certain smelting operations." These are, first, treating "the solution of manganese obtained in the manu- " facture of bleaching powder with milk of lime" and obtaining " a precipitate applicable as a pigment."

Second. Dissolving burnt iron pyrites with muriatic acid and with heat, or otherwise, and precipitating "the iron dissolved thereby " by the aid or agency of milk of lime; the oxide thus produced " may be used as a pigment." When the burnt pyrites "con- " tains copper, as it frequently does," the copper is precipitated " from the solution before adding the milk of lime, and the " copper thus obtained being a secondary product reduces to a " merely nominal cost the expense of producing the oxide of " iron."

Third. Utilizing "the waste muriatic acid by dissolving therein " waste materials from smelting works, such as lead, zinc, and " copper, and precipitating the metallic oxides from this solu- " tion by the aid or agency of milk of lime," and thereby obtaining pigments.

[Printed, 4*d*. No Drawings.]

A.D. 1863, August 3.—N° 1914.

GERLAND, Balthasar Wilhelm.—" Improvements in the " manufacture of size, glue, and phosphates." These are said to be "the treatment of bones for the manufacture of size or glue, " and of other substances containing phosphates, for the purpose " of obtaining phosphates in a comparatively pure state by sul- " phurous acid and water without the employment of stronger " acids, and the recovery of the sulphurous acid from the solu- " tions so obtained by means of heat." The bones broken in small pieces, deprived of their fat now or afterwards, are laid upon a filtering bottom of a large shallow cistern filled with water. The cistern is provided with an air-tight cover pierced by manholes closed by moveable lids. Between the cover and the water level is an open space about six inches for the circulation of the sulphurous acid gas, by burning sulphur or pyrites, &c., and which gas " enters the top part of the cistern after it is well cooled, " passes over the water, and therein partially dissolves itself, and " is at the other extremity drawn through a flue into a condens-" ing tower." The liquor runs from the bottom of the cistern and passes through a " steaming apparatus for the expulsion of " the sulphurous acid and the separation of the phosphates, then " through a drainer, on which the precipitate of phosphates is " collected, and after having been cooled is lifted on the tower " to supply the same instead of water." The phosphoric acid is likewise recovered from the solution of the phosphates in sulphurous acid by precipitating it with a metallic oxide or salt. " If, for instance, oxide of iron or chloride of iron is mixed with " the liquor, the phosphoric acid is precipitated as phosphates of " iron, and in a like manner the phosphates of other metallic " oxides can be obtained, which may be used as materials for the " manufacture of alkaline phosphates or phospheric acid, accord-" ing to methods well known to chemists." The acid solution may be used again.

[Printed, 4*d*. No Drawings.]

A.D. 1863, August 12.—N° 1992.

NEWALL, Robert Stirling.—" An improved mode of and " apparatus for drying chemical compounds and other sub-" stances." This consists of a " travelling surface for carrying " the material to be dried," made up " of a series of trays carried " by endless chains or an endless belt of latticework, or of a band " of cloth or other material suitable to the character of the " material it is designed to receive." " This endless carrying " surface is to be so mounted that it will travel through an air " chamber, through which a current of air is maintained in the " reverse direction to that of the motion of the travelling sur-" face." " At the other side of the chamber opposite to that at " which the dry air is admitted, is an orifice for the escape of the " humid air. The velocity of the current of air is regulated by a " valve or otherwise." No means are shown of " charging the " trays, but they may either be laden by hand or from a hopper

" placed at the feeding end of the apparatus." If the material is plastic, "a kind of pug-mill arrangement may be used to cause " the material to exude from a die or mouth piece."

[Printed, 8d. Drawing.]

A.D. 1863, August 15.—N° 2030.

GRANTHAM, John.—(*Provisional protection only.*)—"Im- " provements in apparatus for manufacturing salt." These are, as follows:—In making salt hitherto it has "been made in certain " circular covered pans under which heat has been applied, and " from which the salt has been cleared by certain scrapers actuated " by machinery. The steam from these pans has been collected " and passed under second open pans;" "now, in combination " with these methods" it is proposed to cover the "second pan " and collect the steam from it also, and thus again repeat the " process on a third pan;" "but as the steam has now become " much reduced in temperature" it is passed "through a series " of pipes or other metallic surfaces heated by another furnace, " which process is called superheating steam." Means are provided for injecting into the heated pipes "a small quantity of " water as required, by which more steam may be generated to " mix with the steam from the second pan;" "this may be " supplied from any convenient source." Employing in the second pan "certain scrapers to be worked by hand externally, " and merely to be used at intervals as may be necessary, and as " is required in making coarse salt." "It will be evident that " the same processes may be repeated to a fourth and fifth pan, " and so on ad libitum." Also applying a system of pipes by which the brine is circulated through all the pans; the circulation is effected "by means of gravitation, or a pump screw, or in any " other convenient manner."

[Printed, 6d. Drawing.]

A.D. 1863, August 18.—N° 2048. (* *)

ROBINSON, Henry.—"Improvements in lime kilns." At some distance from the bottom level of the kiln, and in pairs at the opposite sides, are placed four fire-places, the flames from which pass into the limestone through apertures in the sides of the kiln. The fire-grates are accessible from air drifts, themselves communicating with the outer air by balanced doors. A chimney, provided with a steam jet and with an aperture for feeding in the limestone, produces the draught. Or the gases may be conveyed to a separate chimney, in which case the steam jet is placed in the fire-flue below, at the apex of the forked flue,—so shaped "for splitting the draught and entering the kiln"—through two apertures. The grate bars are kept cool by means of another steam jet. "A small quantity of fuel mixed with the " lime aids the process of burning." At the bottom of each kiln is a discharge hole furnished with a trough adjustable by levers; or the opening may be at the side, the lime passing through a trough furnished with a pair of slides or double doors. In both cases the kilns have removeable tops.

[Printed, 10*d*. Drawing.]

A.D. 1863, August 20.—N° 2067.

HALLSWORTH, SAMUEL, and PLATT, THOMAS.—(*Provisional protection only.*)—"Improvements in the manufacture of " certain colouring matters known as Prussian blue, Berlin blue, " Paris blue, China blue, and Turnbull's blue." These are, employing "the sediments, waste, or refuse" from, or residuum after "the manufacture of copperas and alum, that is to say, the " sediment of the 'evaporating pans' or 'liquor boilers,' also the " sediment of the 'crystallizing coolers' or vats, and also the " 'mother liquors' remaining in the said vats after the copperas " has crystallized out." To the aforesaid sediments adding "the " prussiates of potasa or soda, or other salts. The sediments are " diluted with water in a vessel, and the salts are dissolved with " water in another vessel; then the two solutions are mixed " together, when precipitation takes place, and the liquid is " removed. The residuum, when dried, is Prussian blue, or one " of the other blues above-named, according to the quality or " kind of prussiate or salt used."

[Printed, 4d. No drawings.]

A.D. 1863, September 5.—N° 2187.

LORBERG, WILLIAM.—"Improvements in the manufacture " of gas and other substances from tar and similar materials." These are, in the mode of carbonization, as follows:—Employing " the usual D-shaped retort about 16 feet long, and open at both " ends," which openings are named "A and B, the exit pipe being

" at B." A charge of raw material, either alone or mixed with tar as described in N° 650, 1861, is introduced at A, and when this charge is about half carbonized the lid is opened at A, and, by means of a kind of partition or slide loosely fitting into the interior of the retort, the mass of charcoal and undecomposed matter is pushed forward " towards B so as to leave empty about two-thirds " of the length of the retort from A, and introduce a fresh charge " of raw material. By the time that this charge is half done and " ready to be moved forward, the former charge will be carbonized, and the charcoal is withdrawn at B, while another " charge of raw material is introduced at A, and so on continuously, the object being always to have two charges in the retort " in different stages of carbonization." " When the gas is to be " used for illumination it should be passed through lime or caustic " alkali, in order to free it from the admixture of carbonic acid. " The other products of the process, as charcoal, tar, acetic " acid, ammonia, naptha," are treated and utilized in the usual manner.

[Printed, 4*d*. No Drawings.]

A.D. 1863, September 8.—N° 2203.

MOND, Ludwig.—" Improvements in obtaining sulphur and " sulphurous acid from 'alkali waste.'" These are said to be, first, " causing a current of air or air mixed with acid gases " or steam, either heated or cold, to be drawn or driven through " the mass of waste."

Second, " performing the said operation in the same vessel in " which the usual lixivation of the 'black ash has' been effected."

In preference " in place of the set of four vats generally in use " for lixivating the black ash, employing a set of twelve, four of " which are always filled with black ash in the process of lixiviation and the remaining eight with waste to be operated " upon." " The lower parts of all the vats are connected with a " fan capable of propelling about three cubic feet of air per minute " for every hundred weight of dry waste, and at a pressure of " about four to seven inches of water." " The air before entering the fan passes through pipes placed in a furnace, flue, or " other heating apparatus." " A small quantity of carbonic or " other acid gas may be added advantageously to the air." When " sulphides are desired the air is to be used cold or at a

" low temperature and to be driven through the waste at a " moderate speed." When hyposulphites are desired, " the air " is to be used hotter and at a greater speed, but in each case the " temperature of the waste should be kept between 120° and " 200° F." The waste may have to be aired and washed three times. " The liquor thus obtained may be utilized by any known " method." It may be treated with sulphurous acid, heated by steam to boiling, and decomposed by muriatic acid or waste liquor from bleaching powder stills, and the gases made to enter a vitriol chamber; an excess of original liquor is then added, and again an excess of muriatic acid and steam, sulphur precipitates, and is collected and washed.

[Printed, 4*d*. No Drawings.]

A.D. 1863, September 9.—N° 2222.

CLARK, William.—(*A communication from Amédée Gélis and Lucien Dusart.*)—" Improvements in the means of utilizing refuse " azoted matters of commerce for the manufacture of various " chemical products." This Invention, it is said, " embraces a " whole series of operations, the final result of which is the production of the following chemical substances, viz., ammonia, " prussiates of potash or soda, carbonate of potash or soda, sulphuret of iron, and also of two commercial raw materials, flax " and cotton." The means employed for producing the above result are, generally speaking, of two kinds, 1st, by the action of alkaline sulphurets upon matters of animal origin; 2ndly, by the action of heat on the alkaline mixture of animal matters in the presence of oxide of iron. " When any azoted matter such as " fibrin, wool, silk, leather, hair," &c. " is heated in a solution of " alkaline sulphurets, especially those of potassium and sodium, it " becomes entirely dissolved without the ammonia being evolved " at 212° F., and under the atmospheric pressure, one part of " sulphuret dissolving from four to five parts of animal matters. " When working at a high pressure, but not exceeding five atmospheres, the amount of animal matters should be twenty times " at least the weight of the sulphuret." If instead of albuminous or " azoted matters, ligneous materials are treated, such as flax, " hemp, or cotton, no solution can be obtained," while the fibres retain their primitive qualities." In this way " cotton, flax, or " hemp, are separated from the animal materials contained in

" mixed fabrics. After separating the cotton and other threads " there remains from the foregoing operation a solution of animal " matters in the sulphurets," which solution is evaporated to a syrupy condition, some peroxide of iron is added, still continuing the heat "until on a small quantity being dropped on a cold body " it becomes solidified without adhering thereto. The whole is " then submitted to a strong heat, which causes water to distil " charged with a considerable amount of ammonia, and when " the vessel is red hot, and no more gas is disengaged, the whole " is allowed to cool out of contact with the air; there remains in " the retort a black matter in a half melted condition, consisting of a mixture of prussiate and carbonates of potash or " soda, according to the alkali used, and some sulphuret of iron " and carbon. The treatment of this matter by water eliminates " the prussiate and carbonate which are separated by crystallization, " while the mixture of sulphuret of iron and of carbon is dried " and serves for the preparation of sulphurous acid." The residue is oxide of iron, which is again used. "The ammoniacal waters " are treated in the usual way for the preparation of ammoniacal " salts." The fibres obtained as above are applicable " for paper " making or spinning purposes."

[Printed, 6*d*. No Drawings.]

A.D. 1863, September 11.—Nº 2245.

GERSTENHÖFER, Moritz.—" An improved construction of " furnace for roasting pyrites." This is constructed so as to supply the pulverized ores of "pyrites at the top of the oven, and " causing it to trickle down in a finely divided state from one set " of ore bearers to the other until it arrives at the bottom of the " oven, so that it may be brought into intimate contact with the " ascending current of air." " After drying the ores the pulverized pyrites are put into feed boxes above," which are furnished with coarse wires or sieves to keep back stones or lumps, " in " order to prevent them from breaking the feeding rollers." " The bottom of these feed boxes are funnel-shaped and are " divided into three compartments." These feed rollers are made to rotate slowly, and conduct the pulverized pyrites down to the vertical openings or slits, through which they fall down into the main chamber of the furnace. " The inclined iron plates placed " above the feeding rollers can be taken away in order to clear

" the slits if necessary. The feeding rollers are actuated by screw " wheels and screws, which are turned by any suitable moving " power. The stamped ores fall down through slits on to the upper " three ore bearers, from whence," after the pyrites have reached a " certain angle, they will fall down on both sides of the bearers " on to the bearers below. The ore bearers are made of fire-clay, " their form being prismatic." "The roasting of the ore will " proceed while it is gradually passing down from top to bottom, " while the passing air is in constant motion in the opposite " direction." The gases pass into the upper part of the oven and into the back part of the oven, where they are forced to go downward and to deliver their heat to a series of clay pipes, through which the fresh air is admitted to the furnaces. The gases pass into a wide chamber, where any dust and arsenious acid is deposited, and the sulphurous acid passes into the lead chambers to form sulphuric acid.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1863, September 17.—N° 2283.

DE WYLDÉ, Fédor.—"Improvements in the manufacture of " hydrated silica." These are, "dissolving natural hydrated silica " in a solution of carbonated alkali under pressure and subject " to the heat of steam, which solution of silica in carbonated " alkali is precipitated on exposure to the atmospheric air, resolv" ing itself into its original constituents, carbonated alkali " and silica, the latter being in a finely divided state, all iron " and other insoluble matters forming a residuum in the digester " The organic matters are dissolved and retained in solution in " the alkali, whilst any remaining in the precipitated silica may " be removed by washing, leaving the silica in a state of perfect " purity."

[Printed, 4*d.* No Drawings.]

A.D. 1863, September 18.—N° 2294.

LORBERG, William.—"Improvements in the treatment of " rags and obtaining valuble chemical products from the animal " fibre therein." These are, treating mixed fabrics containing vegetable and animal fibre, "known in the trade as lindseys, " stuffs, bodies, shallies, seams, and the like, and have for their " object the separation or recovery, the cleansing and bleaching

" of the vegetable fibre, and obtaining valuable chemical products " from the animal fibre; also destroying the colors of and bleach- " ing coloured and printed cotton goods containing no animal " fibre." The rags are digested in a solution of caustic alkali, soda or potash, of from 2° to 15° Baumé, which dissolves out the animal fibre, leaving the vegetable fibre intact. The operation takes place in the cold, but a temperature just below the boiling point of the liquid is preferred, and having a condenser for collecting the "ammoniacal vapours evolved." A solution of soda is preferred. After digestion the goods are pressed. The liquor may be used again. After the goods have passed through the first process they are thrown into a tank and washed and rinsed; it will be seen that some of the goods are white while others are grey, or of their original colour or nearly so. The rags are sorted, and the grey or nearly white are put into dilute acid before bleaching. The goods which are coloured are put into a weak alkaline bath, to which in preference has been added a small quantity of red prussiate of potash; after remaining some time the goods are wrung or pressed and passed into the acid bath, and are then treated alike with the grey and nearly white. Should the action not be complete the above must be repeated. The bleaching is effected with a weak solution of chloride of lime. The alkaline liquid containing the dissolved animal fibre may be used as manure in the liquid state or boiled down to dryness. For cyanogen and ammonia it is destructively distilled, collecting the gases. If the object is to obtain as much ammonia as possible, the syrupy mass is mixed with lime previous to distillation; the residue in the retort "contains charcoal with carbonate of lime and soda " (or potash) and other compounds, together with considerable " quantities of cyanide of sodium (or potassium)" which is extracted in the usual manner and converted into ferrocyanide, if desirable. If the "object is to produce cyanogen compounds in " preference to ammonia," adding "to the syrupy mass soda ash " (or pearl ash) in proportion to the quality or strength of the " liquid, and subject it to distillation in the usual manner, taking " care to collect the ammonia as well, which is necessarily or " usually evolved." "The illuminating gas evolved during the " process, and which is of very good quality, may be utilized for " lighting purposes or burnt in the furnace."

[Printed, 4*d*. No Drawings.]

A.D. 1863, September 24.—Nº 2356.

WEBSTER, JAMES.—"Improvements in utilizing the waste flux "from galvanizing works." These are, treating the waste flux as follows:—In the galvanizing of iron "a considerable quantity "of muriate of ammonia or sal ammoniac is used as a flux," and "in a short time a dirty mass is produced, consisting mainly of "chloride of zinc, oxide and carbonate of zinc, a little metallic "zinc, and occasionally a trace of muriate of ammonia." Hitherto this has been of little use. "The object of the present invention "is to utilize this material, and to this end," any quantity of the spent flux is macerated in either hot or cold water for from 5 to 10 hours, and when most of the chloride of zinc has been dissolved out the solution is stirred, which causes the oxide or carbonate of zinc to be held in suspension; the solution is drawn off into "a "second tank standing at a lower level, and if necessary, repeat "the process of maceration in the first tank, until the greater "part of the chloride of zinc has been dissolved and run into "the second tank." The oxide or carbonate of zinc is allowed to settle down, and the liquid is run into a third tank, washing the oxide or carbonate of zinc remaining behind. "The liquid in "the third tank" is now treated "with ammoniacal liquor, such "as the refuse liquor from gas works, which causes a precipitate "of oxide of zinc and leaves a solution of muriate of ammonia. "This solution when evaporated and crystallized in the ordinary "way may be used in galvanized works or disposed of elsewhere." The precipitate undissolved in the first tank would find a ready market among refiners. "The precipitates in the second and "third tanks are, when properly dealt with, very suitable for con- "version into paint."

[Printed, 4*d*. No Drawings.]

A.D. 1863, September 25.—Nº 2364.

SPENCE, PETER.—(*Provisional protection only.*)—"Improve- "ments in the production of sulphocyanide of ammonium and "other sulphocyanides." These are said to be, "the use of the "ammoniacal liquor produced in gasworks" for the above purposes. It is proposed to "drive off the volatile salts of ammonia, "and then to crystallize the chloride of ammonium. The mother "liquor is then diluted, the extraneous matters being by these

" means precipitated, and the clear solution taken for use. To this " is added a mixed solution of sulphates of copper and iron, by " which sulphocyanide of copper is produced, which, being treated " with a solution of sulphide of ammonium, the copper is precipi" tated, and sulphocyanide of ammonium formed, which may be " crystallized by steam heat." "In producing other sulphocya" nides" using "another salt in place of the sulphide of am" monium, as, for instance, sulphide of soda or potash."

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 2.—N° 2422.

BOWRON, JAMES, and ROBINSON, GEORGE.—(*Provisional protection only.*)—" Improvements in the manufacture of soda." These are, acting upon sulphate of soda with " iron in a melted " or liquid state in a suitable vessel or furnace, having flues or " passages communicating with a chamber for the manufacture " of sulphuric acid. The sulphur is in the first place taken by " the iron, leaving the soda free, and by continuing the heat for " a certain time in the presence of atmospheric air it is burnt into " sulphurous acid gas," which is converted in the usual way into sulphuric acid. "The residue, consisting of oxide of iron and " soda, may be treated with water, when the soda will be dissolved " out." Or " the sulphate of soda may be heated with car" bon, as is usual, to convert it into sulphuret of sodium, and " this may then be treated with melted or liquid iron as above " described."

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 8.—N° 2467.

LORBERG, WILLIAM.—" Improvements in the manufacture of " gas from tar." These are, "in the manufacture of illuminat" ing gas, and accessory products, from tar in ordinary gas retorts, " by mixing the tar with lime," as follows :—The tar is mixed " with lime in sufficient quantity to form a plastic, nearly solid " mass," which is " cut into lumps and cakes," and introduced into gas " retorts at the usual temperature of gas retorts." Equal weights of tar and lime, that is to say, about twelve pounds of lime to the gallon of tar, answers the purpose, but an excess of lime is desirable. Ordinary slaked lime in the shape of powder offers some advantages; for the sake of economy, however, "waste lime, such as the waste luting of gasworks, soap ash, "and, more particularly, the lime ground of tan yards," is used. "These lime grounds, containing a large proportion of hair and "other animal matter, produce a very good gas, and much ammonia, if distilled alone." "The tar is oily, and very rich in "ammonia; it is well adapted for the distillation of oils, ammonia, "and naphtha."

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 20.—N° 2571.

DIXON, WILLIAM ADAM.—(*Provisional protection only.*)—"Improvements in making aluminate of soda and other aluminous salts." These are, first, "a solution of tersulphate or "other sulphate of alumina, either natural or artificial," is "first "neutralized with carbonate or hydrate of lime, and the precipitate is allowed to settle, and the clear liquid is poured off. If "the proportion of alumina contained in the precipitate is not "known, it is ascertained, and the precipitate is treated with "rather less than an equivalent proportion of caustic soda lye, "with or without heat, by which means the alumina is dissolved, "and the iron and other impurities are left behind." "Instead of "caustic soda an equivalent proportion of carbonate of soda, "together with an equivalent proportion of hydrate of lime may "be added. The resulting solution of aluminate of soda is "evaporated."

Second. The tersulphate or other sulphate of alumina is heated to drive off the sulphuric acid, and the impure alumina fused with an equivalent proportion of caustic soda or carbonate of soda, and the mass kept fused until any oxide of iron it may contain falls to the bottom. "Instead of using caustic soda or carbonate of "soda for fusing, the proportion of iron contained in the mass "may be determined," and "sufficient sulphide of sodium be "added to convert the iron into sulphide, the quantity of caustic "soda or carbonate of soda added being diminished in proportion to the sulphide of sodium employed."

Third. Employing aluminate of soda obtained as above in the manufacture "of other aluminous salts," "whereby freedom from "iron is secured."

[Printed, 4*d*. No Drawings.]

A.D. 1863, November 3.—Nº 2721.

HENRY, Michael.—(*A communication from Alphonse Pallu.*)—(*Provisional protection only.*)—" Improvements in the manufac-" ture of zinc white." These are, first, " combustible gas raised " to a high temperature is admitted into the retort, muffle, or " crucible containing the melted zinc." " As the gas and me-" tallic vapours are passing away from the retort," " they are " met by currents of hot air, which effect their combustion, and " at the high temperature evolved the oxide will be produced."

Second. " Combustible gas," heated, is admitted into the retort, and a portion of such gas is burnt therein by heated air introduced through a separate opening. " As the zinc vapours " and the excess of unburnt gases are passing away from the " retort, they meet with additional currents of air, and are burnt " as in the first method."

Third. " Combustible gas and air are not conducted into the " body of the retort or crucible, but having been previously heated " they are brought into contact with the metallic vapours as these " are passing away from the retort; this may be done by admit-" ting the gas and air into the retort beak."

Fourth. Placing the zinc " in a reverberatory furnace instead " of in a retort," and admitting combustible gases. Premature oxidation is " prevented by introducing the gases over the body " of melted metal, and the air at a higher point." While distilling there is no communication with the outer air except through the chimney. As the products of combustion pass to the chimney the zinc white is separated and deposited in chambers. Any unmarketable products are bleached by a current of carbonic acid and steam under pressure. Instead of gases, air, " as for instance, " at a temperature at which it issues from Siemens' regenerating " furnaces," may sometimes be used.

[Printed, 4*d*. No Drawings.]

A.D. 1863, November 6.—Nº 2758.

TOWNSEND, Joseph.—" Improvements in the manufacture of " nitrate of potash." These are, " nitrate of soda is taken in " conjunction with muriate of potash, sulphate of potash, or car-" bonate of potash, as is usual; but instead of adding thereto as " much water as will dissolve the whole, or nearly the whole of " both salts employed, there is added a smaller quantity of water,

" such water being hot." The solution is preferred to be " about " 102 degrees Twaddell, but a somewhat greater or less strength " will also answer." The solution, being formed, is " run into " vessels fitted with filter beds, and is allowed to stand sufficiently " for the muriate, sulphate, or carbonate of soda to be deposited." " The solution of the nitrate is drained off through the deposited " soda salts, and is conducted into crystallising vessels, where it " partially crystallises without being again heated, and whilst " crystallizing it is by preference stirred, so as to granulate it." The mother liquor is evaporated and crystallised as before. " The " crystalized nitrate of potash is washed or treated with cold water " to remove any muriate, sulphate, or carbonate remaining with " it " in vessels with perforated false bottoms; " the water is " either made to drain slowly through it downwards, or is intro" duced below, so as to rise up slowly through it." "The water " used in this process is employed in making fresh solutions of " the raw materials, or it may be evaporated so as to yield further " quantities of the nitrate of potash." " The nitrate of potash, " after being washed as described, is dried by preference by " means of a hydro-extractor, aided by hot air."

[Printed, 4*d*. No Drawings.]

A.D. 1863, November 16.—N° 2875.

BROOMAN, Richard Archibald.—(*A communication from Charles Louis Edouard Lequin.*)—(*Provisional protection only.*)— " Improvements in the manufacture of salt, and in boilers to be " fed by salt water." These are, first, utilizing the heat of the gases of the " blast and other furnaces, cupolas, coke ovens, and " other fireplaces; also the heat and gases given off by steam " generators and hot-air apparatuses used in connection with such " furnaces and fireplaces, or otherwise, for the manufacture of " salt, by leading the gases and other products through conduits " or passages under evaporating pans or vessels containing the " salt liquor."

Second. " Feeding steam generators with water impregnated " with sea salt, and thereby manufacturing salt as well as obtain" ing steam," preferring the construction of boiler about to be described, heating " the water before its entrance into the gene" rator to a temperature of 140° to 150° F., whereby it is deprived " of a great part of the carbonates and sulphates which it holds

" in solution." "The generator is formed of two main parts, the " generator proper, by preference tall and narrow, and a reservoir " below the generator, capable of being separated from it when " required by a cock or a slide." The fire is placed some distance from the bottom, and flues surround the generator above the fire. " As the water is evaporated salt is deposited in the reservoir, and " when communication between the generator and reservoir is " shut off by the cock or slide the salt may be removed through a " manhole or otherwise," removing any "scum and incrustation that may be formed on the surface of the water through the " top of the generator." "The feed pipe by preference leads to " the lower part of the generator."

[Printed, 4*d*. No Drawings.]

A.D. 1863, November 26.—N° 2971.

LAMING, Richard.—"Improvements in preparing materials " useful in the purifying of gas from sulphuretted hydrogen, " carbonic acid, and ammonia, and in making ammoniacal compounds." These are said to be, first, "preparing hydrated peroxide of iron by exposing metallic iron in small pieces to the " action of carbonic acid artificially dissolved in water, whether " accompanied by sulphuretted hydrogen or not, and precipitating " by the agency of atmospheric oxygen."

Second. Preparing the same oxide by "forcing atmospheric air " into a solution of iron in water impregnated with carbonic acid, " whether accompanied by sulphuretted hydrogen or not."

Third. Preparing the same oxide "by combining the sulphuretted hydrogen in the ammoniacal liquor of gasworks with " metallic iron in small pieces, and exposing the resulting black " oxide to the air to become oxidized."

Fourth. "Desulphurizing the ammoniacal liquors of gasworks " by the action of metallic iron in small pieces, with or without " the simultaneous influence of the atmospheric air."

Fifth. "Desulphurizing and enriching the ammoniacal liquors " of gasworks by forcing into them while containing metallic " iron in small pieces, or black sulphate of iron, or oxide of iron, " a current of atmospheric air."

Sixth. "Obtaining, in a state of inodorous combination, the " ammonia." "The ammoniacal liquors of gasworks, after they " have been" desulphuretted as above or by other means, or the desulphuretted liquors distilled, are mixed with a solution of muriate or sulphate of manganese, and thus form "insoluble car-" bonate of manganese and solution of muriate or sulphate of " ammonia." These two compounds are separated, and each subjected "to a boiling heat until it no longer exhibits any " objectionable odour." The salt of ammonia is next decomposed by lime, and the ammonia distilled off; at the same time "the " carbonate of manganese contained in a close vessel" is decomposed by dilute muriatic or sulphuric acid, and its carbonic acid is conducted "into the vessel containing the free ammonia," " forming a pure carbonate of ammonia." Modifications of the above process are described.

Seventh. "The use of the desulphuretted ammoniacal liquors of " gasworks for decomposing sulphate and muriate of lime into " solutions of sulphate and muriate of ammonia, either for the " manufacture of ammoniacal salts, or to be deodorized by heat, " decomposed by lime, and distilled as sources of free ammonia."

[Printed, 4*d*. No Drawings.]

A.D. 1863, December 1.—N° 3009.

JONES, Benjamin.—(*Provisional protection only.*)—"Improve-" ments in separating sulphur from alkali waste." These are, running hot water on the waste in a vessel, in a few hours drawing of the liquor, and precipitating the sulphur by means of hydrochloric acid, and filtering. This precipitate dried is "put " into the kind of furnace commonly used for producing sulphur " from sulphur stone," and the sulphur in vapour is driven off into a tower, and condensed with water; the sulphur is collected " at the bottom of the tower."

[Printed, 4*d*. No Drawings.]

A.D. 1863, December 2.—N° 3029.

HOLDREGE, Henry.—(*A communication from William Henry Gwynne.*)—"Improvements in the process and manner of making " gas for illuminating, heating, and other purposes, a part of " which may also be applied to the production of metallic oxides." These improvements "have relation more particularly, and to the " greatest extent, to the production or making of gas from water, " or the vapour of water." In reference to this subject it is stated that it is "capable of being applied or used for the produc-

"tion of metallic oxides in connection with the decomposition of "the vapour of water," and a retort is described which it is said is "suitable for so producing metallic oxides." At the bottom of the retort is a distributing coil or chamber "to heat the steam "and deliver it in small jets through the decomposing material," which when melted is sufficient "to cover the retort three or "four inches in depth over the distributing pipe;" or, a suitable stream of melted metal may be run directly into the retort by a pipe, and steam is admitted into the circulating or distributing pipe, "where it is superheated and distributed through the red "hot material, and is decomposed into oxygen and hydrogen, "the former gas combining with the metal, and the latter, set free, "passes out of the stand pipe" into the washer and purifiers, and to a gasometer; or before purifying it may be passed into a retort containing hydrocarbons, and made into illuminating gas. "If oxides of lead or zinc, or other metals which sublime at "high temperatures, be wanted it will be advisable to attach a "subliming chamber or retort for that purpose."

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1863, December 3.—No 3044.

BOWRON, James, and ROBINSON, George.—"Improvements in the manufacture of soda and sulphuric acid." These are, first, decomposing sulphuret of sodium by means of oxide of iron; if caustic soda is required, a reverbertory furnace is not suitable, but a cylindrical retort is preferred, "capable of having "rotary motion communicated to it, and heated by a fire beneath "it to a red heat." "The sulphuret of sodium in powder is intimately mixed with the oxide of iron." The heat is applied from half an hour to an hour. "On withdrawing the mass from the "retort after the completion of the process, and placing it in water, "it will be found" that insoluble sulphuret of iron is formed and caustic soda is in solution, and is drawn off and "either evaporated "so that dry caustic soda may be obtained, or if desired, the "soda solution may be carbonated before evaporation." The sulphuret of iron washed and dried is "roasted in a current of air, "and the resulting sulphurous acid gas passed into a chamber or "vessel for the manufacture of sulphuric acid in the ordinary "manner." Instead of reducing the sulphuret to powder and then mixing it with the oxide of iron, the latter substance may be heated to redness in a close vessel or furnace, and the sulphuret of sodium then placed upon it; some modifications of the process are described, and it states that "the object in all modifications" of the above process is to "transfer the sulphur from the sodium " to the iron," with as little exposure to the air as possible.

Second. In making sulphuric acid from "pulverized or other-" wise minutely divided pyrites or sulphuret of iron or copper," using a rotating cylindrical retort of iron, &c., with a door at one end partially closed to regulate the influx of air, and a pipe at the other in connection with the acid chamber.

[Printed, 4*d*. No Drawings.]

A.D. 1863, December 11.—N° 3131.

SOLVAY, Ernest.—"Apparatus by means of which the forma-" tion of carbonates of soda by direct combination is rendered " practically available for manufacturing purposes." This consists in "bringing into the presence of each other, either successively " or simultaneously, carbonic acid, ammonia, and common salt." " For this purpose, a series of apparatus are employed by which " the successive operations are automatically performed, it being " only necessary to supply them with the requisite ingredients;" and it is stated that no claim is made to the chemical reactions nor to "all the successive operations which are necessary, but the " claims are, first, the apparatus," whereby "the difference of " density of the simple brine with the ammoniacal brine is applied " for effecting the automatic and continuous supply of ammonia by " the difference of level between one and the other." The solution of salt of a certain density flows into a vessel provided with a false bottom pierced with holes, underneath which a pipe supplies the ammonia, which is immediately dissolved by the liquid, which becomes lighter the more ammonia it absorbs. "Now as the " liquor in the solution vessels remains always at the same level " and density the pressure on that side is always equal. To " counterbalance it, the liquid contained in the vessel dissolving the ammonia, rises as it becomes lighter. "The height at " which it makes its exit is regulated in such a manner that when " its density, which was at first from twenty-three to twenty-four " degrees," shall "be reduced to about fifteen or sixteen degrees it " will rise and run over" into the vessel to be treated with carbonic acid gas.

Second. “The combination of the means of condensation of “ the carbonic acid in the ammoniacal brine, which means consist “ specially, first, in the employment simultaneously of the com- “ pression of the gas in the liquid and the division of that gas, “ so as to multiply the surfaces of contact,” still further increasing the efficacy by the distance travelled by the gas; in this apparatus it extends over one hundred yards in the liquid which fills the apparatus. Also “in the employment of a washer in the “ middle of the operation of condensing the carbonic acid in the “ ammoniacal brine, which is effected by an inverse motion of the “ liquid and of the gas. The washer has for its object to neu- “ tralize the action of the inert gases, accompanying the carbonic “ acid; it restores to the liquid before it leaves the apparatus the “ ammonia which it lost in entering it by the action of these inert “ gases, and thus permits the complete reaction which is desired “ to be obtained.” The liquor consists principally of a solution of chloride of ammonium in which is suspended or precipitated bicarbonate of soda.

Third. “Distilling in a single apparatus, the ammonia from the “ liquids which contain it.” By the arrangement of this apparatus, which only allows of the entrance of lime in its middle, the free ammonia is only disengaged in its front part, and is cooled by the mother liquors in the back part, from which it “ carries off the carbonate of ammonia which they contain in “ proportion to its traverse;” “the jet of ammonia is thus regular and always at the same density.”

[Printed, 10*d*. Drawing.]

A.D. 1863, December 14.—N° 3160.

THORNTHWAITE, William Henry.—(*Provisional protection only.*)—“Improvements in the manufacture of chromate of “ potash, chromate of soda, and other salts of chrome, and soda, “ and potash.” These are, first, in manufacturing “of chromate “ of potash or soda or other salts of chrome,” employing “a “ preparation by roasting the ore of chromium with lime or chalk, “ felspar, and fluor spar, or cryolite.”

Second, “for the manufacture of potash or soda,” roasting “ felspar with a mixture of chalk or lime, and cryolite.”

“After the roasting process the salts are to be separated by “ lixiviation, according to the well known methods.”

[Printed 4*d*. No Drawings.]

A.D. 1863, December 15.—N° 3168.

CHADWICK, Henry, and CLENCH, John.—" Improvements " in utilizing the waste liquors resulting from the preparation of " fibrous matters in paper pulp making, and in the machinery or " apparatus to be used therein." These are, first, " the recovery " of carbonate of soda from the waste liquors resulting from the " preparation of fibrous matters in paper pulp making," as follows :—" When manufacturing paper pulp from straw, esparto " grass, hemp, jute, and other fibrous materials," evaporating " the water from such waste liquors " and " roasting to a dull " redness the solid compound." The resulting black mass is afterwards deprived of its carbonate of soda by hot water. The carbonate may be causticized in the usual manner.

Second, " the construction of a furnace with double arched top " for deflecting the flame on to the surface of the material being " operated upon, and with bars or plates suspended from the top " of the furnace for the rapid liberation of steam and gases."

[Printed, 10*d*. Drawing.]

A.D. 1863, December 19.—N° 3213.

TOOTH, William Henry.—" Improvements in the manufacture of iron and steel, and in the machinery, apparatus, and " furnaces used therein, and for the production and application " of gas to be employed in such manufacture, and the application " of parts of the said apparatus to the manufacture of glass and " alkali." These are, in reference to this subject, first, applying " of the reciprocating chambers or cylinders constructed and " arranged " as follows " for fusing the materials employed in " the manufacture of alkali :"—These chambers or cylinders are constructed of wrought or cast iron, outside of which project a number of iron rings by which the cylinder is supported on rollers contained in a tank or vessel filled with water to keep the rollers cool. The lower part of the iron cylinder is in pieces bolted together, and the upper part of the cylinder " is fitted with a crown " of iron or fire brick or bricks composed of plumbago or other " suitable materials," arranged so as to be as near as possible " a " horizontal line running through the centre of the cylinder." " An axial motion is given to the cylinder, which makes from " one-third to two-thirds of a revolution alternately in opposite " directions." In order to stir up the materials in the cylinder as the cylinder rotates "bars of iron arranged parallel to a centre "line may be inserted in the lining of the cylinder, and made to "project internally and also externally, so that by contact with "the air or by dipping into water they may be kept cool." Openings for tuyers are made in the side of the cylinder for admitting air or gas or both combined. In the side is a door for charging, &c.

Second, constructing furnaces composed of circular vessels with solid bottoms made of cast or wrought iron, revolving to and fro horizontally; also constructing such furnaces heated by two fires. The vessels "are bolted or fastened on to a table and fixed at the "top of a vertical shaft, the bottom end of which is supported in "a step, the upper end of the shaft being kept in its vertical "position by a crossbeam and brasses so fitted as to allow the "shaft and vessel freely to revolve horizontally." The upright shaft is provided with a bevil wheel, which receives motion from another bevil wheel fitted on a horizontal shaft. The whole of this gearing is fitted on to a bed plate and enclosed so as to form a tank for water. The sides of the horizontal vessel are perforated with holes to admit of the insertion of iron bars for the purpose of stirring and agitating the materials at each alternate revolution, or "instead of this arrangement projections or ribs may be formed "on the bottom of the vessel."

Third. In employing "of the carbonaceous matters containing "cyanogen in the manufacture of steel by cementation in place of "ordinary charcoal," there is formed ferrocyanide of potassium or sodium, which, as well as the cyanogen gas, may be used in the manufacture of steel. A furnace is composed of an upper and lower chamber, separated from each other by arches of brickwork enclosed with an iron casing lined with brickwork, to the sides of which are fitted two or more fire-places, "so arranged that they "can be charged with fuel, so that the atmospheric air cannot "pass through into the lower chamber without coming in contact "with incandescent fuel and thereby becoming decomposed." On the top of the furnace are pipes to convey away the gas to be stored for use. To manufacture "carbonic acid, carbonic oxide, "and carburetted hydrogen, and hard coke," coal is only used; when cyanogen gas is formed by mixing one hundred parts of coal, coke, &c. with ten to twenty parts of the salt or oxide of iron, and twenty-five to fifty parts of alkali (carbonate of potash or of soda); the upper chamber is charged with this mixture and the fire-places are fed with fuel. A blast of air is forced in through the fuel to keep up combustion and thereby becomes decomposed, and a ferrocyanide of the alkali used is ultimately formed. The residue in the upper chamber of the furnace is "pulverized, and "forced through tuyers on to the wrought-iron or molten metal, "and will convert it into steel," &c.

[Printed, 5*s*. 10*d*. Drawings.]

A.D. 1863, December 22.—N° 3232.

SHANKS, James. — "Improvements in the manufacture of "caustic soda and caustic potash." These are, first, "the desic-"cation and oxydation (when such oxydation is required) of a "mixture of caustic lime with solution of carbonate of soda or of "carbonate of potash (as the case may be), by heating the same "in a reverberatory furnace or other suitable apparatus with "access of air, and thus producing a dry compound in a state "favorable for the abstraction of caustic soda or caustic potash "therefrom by lixiviation and filtration." Solutions of carbonate of soda, or solutions ordinarily occurring in the manufacture of soda, and "known as black ash liquors or red liquors," are employed. If these solutions are not already in a state of saturation, or nearly so, they are concentrated until carbonate of soda crystals begin to deposit, when the quantity of carbonate of soda contained in the liquid is estimated, and "about forty-two parts of caustic "lime is added for each fifty-four parts of carbonate of soda "present therein, and mix them well together." "A violent re-"action takes place and the mixture becomes a pasty mass." This is treated as above until it no longer shows the presence of sulphide. In working with solutions of carbonate of potash, about forty-two parts of caustic lime are used for each seventy parts of carbonate of potash.

Second, "the abstraction of solutions of caustic soda or of "caustic potash from such disiccated compound by lixiviation "and filtration, such solutions being thereby obtained at higher "gravities than similar solutions have heretofore been obtained "from mixtures of solutions of carbonate of soda or of carbonate "of potash with lime." The dry powder withdrawn from the furnace is mixed with water, or with weak solution of caustic soda, "and by injection of steam therein together with thorough "agitation" the mixture is reduced to the consistence of cream;

this mixture is transferred on to a filtering bed, under which a partial vacuum is formed. "When the filtration has proceeded "to such an extent that the solid matter is no longer covered "with supernatant fluid," water is made "to flow into the filtering vessel, so as to keep the solid matter constantly covered "with liquid, and continue such addition of water" until "the "solution running off is free or nearly free from caustic soda."

[Printed, 4*d*. No Drawings.]

A.D. 1863, December 28.—Nº 3273. (* *)

GJERS, John.—" Improvements in kilns for calcining ironstone "and limestone;" consisting "firstly," in "supporting the kiln "upon" "pillars" "in" such manner as that a space may be left all around beneath "the bottom edge" "and the floor for the pur- "pose of allowing the cacined stone as it falls down to be" "re- "moved from every side" of the kiln; secondly, in the use of a cone "at the bottom of the kiln for the purpose of causing the "calcined stone as it falls down to be directed" "towards a "space left between the bottom of the kiln and the floor;" and "thirdly," when "gases from the blast furnace" "are employed "for heating the kiln, the introduction" "of such gases into "the body of the furnace by means of a hollow cone."

[Printed, 10*d*. Drawing.]

A.D. 1863, December 30.—Nº 3295.

WHITELAW, Alexander.—" Improvements in treating brine "from salted flesh or fish for the obtainment of useful products "therefrom." These are, "treating the brine by dialysis or equivalent means for the separation of salt therefrom, and the "utilising of the purified juice thereby obtained." Various ways of applying or using this process are described. One described as most convenient is "to put the brine into vessels which can be "immersed in water in a tank or stream, such vessels being "formed entirely or for the most part of dialytic materials, and "being termed dialysers." Dialytic materials are "parchment, "paper, vellum, bladder, skin, or other animal membrane, or a "soft gelatinous substance combined with a woven fabric; or "again, a porous material such as porous earthenware having the "pores filled with size or the like gelatinous substance. Moist "clay or other suitable plastic material may also be used in

" forming dialytic partitions or envelopes." The salts or crystalloid substances pass through the diaphragm into the water, leaving behind the juices or colloid substances which are evaporated and may be combined with some "farinaceous ingredient " and thereby form meat biscuit." Or, "the purified juice as it " comes from the dialysers may be at once employed in making " rich and palatable soups." The separated juices, " if unsuit- " able for food, may be subjected to destructive distillation to " obtain ammonia and other products, whilst the separated saline " matters may be concentrated and purified." This occurs in the Provisional Specification, but nothing is said of it in the Final Specification.

[Printed, 4*d*. No Drawings.]

1864.

A.D. 1864, January 1.—N° 5.

CLARK, William.—(*A communication from François Marie Aubert de Trégomain.*)—" Improvements in the manufacture of " chlorine." These are, manufacturing " chlorine by means of " bichlorides," and also " revivifying the latter." " After the " bichloride of copper, which is heated to a deep red, has dis- " engaged about half its chlorine and has changed to a state of " protochloride," and while in a state of fusion it is poured on to a marble slab, ground in a mill, introduced into the revivifying apparatus, and air passed into it, it changes " into oxychloride or a " mixture of bioxide and bichloride of copper." " The powdered " oxychloride " is treated with " hydrochloric acid at 23° Beaumé, " in the proportion of about one hundred weight of oxychloride, " supposing it to be dry, to one hundred pounds of acid, or as " six is to seven." " The matters are then heated, and after " cooling crystallization takes place, the mother waters being with- " drawn, and the crystals of bichloride dried and distilled afresh." Also effecting " the revivification of the protochloride by causing " a current of gaseous hydrochloric acid to act on the powdered " oxychloride, which method posssesses the advantage of favour- " ing and accelerating its regeneration by economizing the " labour."

[Printed, 4*d*. No Drawings.]

A.D. 1864, January 18.—N° 131.

VOGT, CARL.—(*A communication from Ludwig Schad.*)—(*Provisional protection only.*)—" Improvements in the manufacture of " pigments." These are, " heating in a suitable vessel a mixture " of any of the oxides of manganese with nitrates of the alkaline " earths, by preference, nitrate of barytes, to which mixture must " be added some white inactive substance, as china clay, whereby " manganate of barytes is obtained in combination with the " inactive substance employed, which is afterwards ground, and " is a green pigment." The proportions used are as follows :— " About 50 parts of nitrate, 10 parts of the oxide of manganese, " and 10 parts of the inactive substance."

[Printed, 4*d*. No Drawings.]

A.D. 1864, January 20.—N° 152.

LIGHTFOOT, THOMAS, BARNES, GEORGE POWELL, and LIGHTFOOT, JOHN.—" Improvements in fixing colors on " woven fabrics or fibrous materials." These are, using " stale " urine, human or animal, but by preference human, and coal gas " water, neutralized by adding arsenic acid or phosphoric acid," either separately or combined, for fixing mordants on cotton or " other textile fabrics or yarns," as a substitute for cowdung. The urine when collected is allowed " to stand for a week, or until it " becomes quite stale, when a quantity of ammonia is formed," then adding " arsenic acid or phosphoric acid in solution until " the mixture turns blue litmus paper slightly red." The excess of acid is neutralized by a small quantity of chalk. In neutralizing coal gas water, the water is taken " at four or five degrees " Twaddel's hydrometer," and is neutralized " in the same " manner as already described " (arseniate and phosphate of ammonia are formed). The modes of using these solutions are described.

[Printed, 4*d*. No Drawings.]

A.D. 1864, January 26.—N° 218.

DARLINGTON, GEORGE.—" Improvements in the manufacture " of zinc white." These are said to be, first, " the oxidation of " the products of the combustion of the contents of the furnace

" (that is to say, the fuel and ore), by the introduction of a hot " or cold blast of air into the said products at a short distance " above the level of the charge from which they are generated."

Second. " The extraction or exhaustion of such gaseous contents of the furnace, which contain the oxide of zinc mechanically suspended in them, and the forcing of them by mechanical " means, such as fans, cylinders, or other similar contrivances, " into the collecting apparatus."

" Oxidised compounds of zinc, such as roasted zinc blende, " calcined calamines, zinc ashes, and zinc dross," are mixed " with coal or coke, from which all gaseous matters have been " expelled," and placed on red hot fuel in a furnace, " somewhat " similar in form to the old coke oven, and through which several " hundreds of small blast pipes pass." The blast being slowly turned on, the gases are "allowed to escape into the open air " through an aperture in the top of the furnace left for this purpose. " When these gases become green in colour, this aperture is " closed and the exhaust apparatus is put into action, at the " same moment the oxidising air is allowed to enter the furnace" about " six inches above the level of the charge in it, and enters " through numerous small blast pipes perforating the furnace;" a perfectly white oxide of zinc is produced and collected.

[Printed, 4*d*. No Drawings.]

A.D. 1864, February 9.—N° 346.

SPENCE, Peter.—" Improvements in the manufacture of " sulpho-cyanide of ammonium and other sulpho-cyanides." These are, the production " of sulpho-cyanide of ammonium, and " other sulpho-cyanides by the use of ammoniacal liquor of gas-" works." The ammoniacal liquor is boiled " in a close vessel or " still, to drive off all the volatile ammonia or salts of ammonia," and the residual liquor is evaporated " in open vessels, until of " the requisite strength to crystallize," and allowed to cool; " it " deposits crystals of dark or impure muriate of ammonia." The mother liquor, diluted with four times its volume of water, deposits a quantity of tarry matter; the clear liquid is drawn off, and a solution or mixture of " sulphate of copper and proto-sulphate " of iron, in about equal quantities, the strength is not important," " is added. "A greyish white precipitate of sulpho-cyanide of copper

" is produced," which is washed. To convert this sulpho-cyanide into sulpho-cyanide of ammonium, it is treated with a solution of sulphide of ammonium, and the solution evaporated by steam heat until it yields crystals on cooling. " The heat of the " solution should not exceed 212° F." These crystals are dissolved and recrystallized, " when they are pure sulpho-cyanide of " ammonium." " In order to produce sulpho-cyanides of potash " and soda," simply using " sulphides of those alkalies, instead " of sulphide of ammonium, as above described."

[Printed, 4*d.* No Drawings.]

A.D. 1864, February 11.—N° 355.

LEE, THOMAS VINCENT.—(*Provisional protection only.*)—" Im" provements in the construction of kilns or retorts for coking, " and for apparatus connected therewith for collecting the pro" ducts of distillation through the agency of hydro-caloric or " superheated steam, these appliances being applicable to making " wood charcoal, and collecting pyroligneous acid during the " process." These are, constructing a kiln or retort " of cast" iron plates, which, when put together, form a square or circular " steam-tight chamber; the plates are cast with pipes on them, " so that when jointed together the interior surface of the kiln or " retort is surrounded with a continuous pipe, which being per" forated with small holes, emits the hydro-caloric which operates " upon the coal or wood." " The kiln or retort (there may be " any number) is placed vertically and charged at the top;" " when the coking or charring is completed, the bottom end, " which runs on a slide, is drawn, and the coke or charcoal falls " into or upon a cart for its reception." " A blow-off pipe carries " away the sulphur from the coal during the process, and at the " bottom of the kiln or retort is a pipe which conveys the tar to a " receptacle outside, from whence it is conveyed to the distilling " chamber, and creosote is produced therefrom." " The same " arrangements, with some slight modifications, are used for " making wood charcoal, and collecting the pyroligneous acid " resulting from the operation." It is stated that the hydrocaloric or superheated steam" is created " in a similar manner to " the description given in" No. 2969, 1853, No. 1229, 1855, and also in 528, 1863, specifications not included in this series.

[Printed, 4*d.* No Drawings.]

A.D. 1864, February 11.—N° 358.

DAVIES, George.—(*A communication from John Smith, and John Richard Savage.*)—(*Provisional protection only.*)—"Improvements in the manufacture of sulphuric acid." These are, first, "concentrating sulphuric acid by submitting it to the action of "steam-heated leaden worms in leaden pans."

Second. "Concentrating the acid to a greater density" "by "introducing the acid into a still containing a steam-heated "leaden worm, thereby effecting a great saving in the expense of "manufacturing this important article of commerce."

[Printed, 4*d*. No Drawings.]

A.D. 1864, February 11.—N° 360.

JOHNSON, John Henry.—(*A communication from Anthony Pollak.*)—"Improvements in the manufacture of superphosphates "to be employed in the making of bread, and in other purposes "in the arts." "To 10,000 lbs. of water are added 1,000 lbs. of "oil of vitriol; to this mixture are added, with constant stirring, "1,400 lbs. of burned bones, and a brisk agitation is maintained "for from 16 to 18 hours, when the whole is drawn into a suitable leach or vessel, and thoroughly lixiviated." This extract is concentrated, and "as the evaporation proceeds, finely ground, "thoroughly calcined bones are added to the solution in the proportion of 10 lbs. to every 10 wine gallons standing at 25° "Baumé." "The concentration is continued till the powdered "bone ceases to be perceptible between the thumb and finger, and "the liquid assumes a viscid and creamy consistency." "A "white crystallizable compound of lime and phosphoric acid" is produced, "which, on cooling, solidifies, and may be exposed to "ordinary atmospheric air indefinitely long without absorbing "moisture." "This crystalline superphosphate of lime will be "found to be too concentrated for convenient practical use in "bread making, and in other applications to the useful arts." To dilute it, the liquid as before stated of a viscid and creamy consistency, "is removed from the fire, is slightly diluted with "gelatinized water, made such by the addition of boiled starch, "and is occasionally stirred for several hours to prevent agregation in crystalline groups." When cool, washed potatoe starch is added in certain proportions, and thoroughly incorporated, adding water, if necessary, until no dry starch is visible; ultimately it is thoroughly dried and pulverized. Superphosphates are also prepared as follows:—Adding to " the extract of the " burned bones treated with the oil of vitriol and water, and " leached as above described, for each degree of Baumé, for every " gallon," 0·0144 lbs. of hydrate of soda, or 0·0203 potash, or 0·0180 " hydrated carbonate of magnesia, or " corresponding " equivalents of carbonates of soda and potassa, or caustic magnesia," concentrating " to an emulsion of fine crystals, when the " viscid liquid, on cooling and standing, solidifies. The mass in " either case does not absorb moisture in ordinary atmospheric " air." From this point each are treated in the same manner as " the superphosphate of lime, with gelatinized water and dry " starch" or its equivalent. " The proportions above given may " be varied slightly without detriment." These superphosphates, among other purposes, are used as yeast powders or baking powders when mixed with bicarbonate of soda in certain proportions.

[Printed, 4*d*. No Drawings.]

A.D. 1864, February 23.—N° 454.

COTELLE, Eugène Alphonse.—" An apparatus for concen- " trating and distilling sulphuric and other acids, and all solutions " in general." This is composed of a conical retort placed vertically, " the smaller end uppermost;" it is formed of compact refractory clay." " It is closed at bottom by means of an obtu- " rator " of a " concave form, and having at its centre a hole for " the escape of liquid under treatment. This retort is nearly " filled with pumice stone or other body uninfluenced by heat, " and proof against the action of the liquids being treated. This " retort is closed at top by an obturator," having at its centre " a small funnel-mouthed aperture for the introduction of the " liquid. This obturator is also furnished with a pipe in com- " munication with a stoneware refrigerator," at the base of which " latter there is a pipe, also of stoneware, for conveying the non- " condensed vapours into a chimney having a quick draught. " This pipe carries at the bottom part a small spout, through " which the condensed liquid is returned to the retort. The pipe " of lower obturator of the retort fits into the upper part of a " leaden refrigerator, through which the liquid passes before " entering a carboy. The retort is heated by a furnace, the flame " of which circulates several times round the retort. Above the

" furnace is a reservoir, containing the liquid to be treated." A " pyrometer composed of a bar of round iron in contact with the retort projects from the furnace, and " in expanding actuates " an index hand traversing a graduated arc."

[Printed, 1*s*. Drawings.]

A.D. 1864, February 24.—N° 463.

JONES, **Benjamin**. — (*Provisional protection refused.*) — " An " improved method of obtaining sulphur from alkali waste." This consists, first, in converting " the insoluble sulphide of " calcium, as existing in the waste, into a soluble bisulphide of " calcium by treating the alkali waste with water and steam in " appropriate vessels," confined or open to the air.

Second, " in the method of separating the soluble bisulphide " from the insoluble residues." No method is given.

Third, precipitating " the sulphur from the solutions by means " of hydrochloric or any other acid, either at the ordinary or any " other elevated temperature."

[Printed, 4*d*. No Drawings.]

A.D. 1864, March 8.—N° 580.

NEWTON, **William Edward**. — (*A communication from Louis Pierre Robert de Massy and Louis Robert de Massy.*)— " Improvements in the manufacture or production of baryta " and strontia." These are, " the production of baryta and " strontia by the decomposition of their sulphate into sulphuret, " and the transformation of the sulphuret into a hydrate, by " means of oxide of copper or any other oxide by separating the " precipitates from the salts of baryta, which finishes by saturating the oxide of copper, such separation being effected by " transforming the insoluble salt of copper into a soluble salt of " copper, and utilizing for the production of sulphuric acid the " sulphurous acid arising from the roasting of the sulphurets."

The sulphates of baryta and strontia are converted into sulphurets by roasting with charcoal, and their solutions boiled with oxide of copper. The hydrates of these alkaline earths are in solution, and the sulphuret of copper is precipitated. " The " solution is separated in the hot state from the precipitate by " means of decanting or by washing." The sulphuret of copper is dried and roasted, the gas produced is conducted into leaden chambers, and "the deutoxide of copper is put on one side to "serve for the succeeding operation." In the course of time, after many times being used, the oxide of copper, after the roasting, is found to contain such a quantity of sulphate of baryta as to impede its action; in this case the oxide of copper is dissolved by an excess of hydrochloric acid, and the solution of copper is decomposed by sulphuret of barium, and "the chloride of barium "is converted into a sulphate by the ordinary process."

[Printed, 4d. No Drawings.]

A.D. 1864, March 29.—Nº 783.

DOUGHTY, Charles.—(*Provisional protection only.*)—"Improvements in treating a product obtained in refining the oil "of cotton seeds." These are as follows:—The "residue or "waste called mucilage" "is placed in an open vessel and "heated by free steam till it comes to about 212° F., when a "quantity of cream of lime or quicklime mixed with water is "stirred in. The boiling by free steam is continued for some "hours. The contents of the vessel are then allowed to cool "and sulphuric acid is added. The materials are then again "boiled by free steam for some hours, the scum being removed "from time to time. The contents of the vessel are then allowed "to stand, and they will separate into three layers. The fatty "matters will float at the top; below the fatty matters there will "be water combined with alkali or other matters in solution; "and at the bottom the heavier matters will be found." After detailing the method available for obtaining the fatty matter, it is stated that "the alkali may be obtained from the water by evapo-"ration, and from the residue by washing the lime and evaporating "the wash waters."

[Printed, 4d. No Drawings.]

A.D. 1864, March 30.—Nº 791.

SMITH, Thomas James.—(*A communication from François Haeck.*)—"Improvements in the purification, distillation, rectifi-"cation, evaporation, condensation, concentration, and oxygena-"tion of spirits and spirituous liquors, and in the apparatus "employed therein and in raising and forcing the same; parts of "which are applicable to the manufacture of vinegar, to the "raising and forcing of liquids, to the heating, cooling, and "oxygenating of beers and liquids, and to the construction of chimneys." In describing the various processes employed in carrying out the above operations and the apparatus employed therein, it is stated that the process "for regulating at a fixed temperature and oxygenating to an exact amount is also applicable to the manufacture of vinegar, since the production of vinegar is only an oxygenation of the liquid by means of air introduced in suitable quantity." This operation is described as follows:—An open jacket is constructed in the form of a gutter; the inner side of the jacket is pierced with vertical, rectangular, or other shaped holes at a small distance from each other. The liquid to be cooled coming from the reservoir placed sufficiently high, is made to enter a narrow gutter in a double stream by means of two pipes in such a manner as to produce in the gutter a circulatory motion as rapid as possible; this circulatory motion of the liquid causes it to pass everywhere equally into a space in the interior of the vessel by the lateral holes from the gutter, from thence it descends into a widened space and into a pipe by which the cooled liquid makes its exit. The refrigerating water enters by two pipes extending horizontally the whole length of the interior of the space. The refrigerating water is renewed according to the quantity of liquid which is passed through the apparatus. "To explain the manner in which the exact amount of oxygen indispensable to good fermentation is introduced into the liquid:"—At the orifice of the pipe where the cooled liquid makes its exit is a cylindrical trough or vessel, divided, as it were, in two by a horizontal plate, in which is fitted a number of small tubes open at their two ends, and all of the same diameter. Immediately above the division plate they have an opening "through which the liquid passes from the trough, and flows through the lower ends of the tubes. This flowing produces in the bottom of each tube a continuous suction which drives air through the upper opening of each tube. The current of air mixes with the current of liquid which passes through the tubes; it mixes with it also by the falling of the liquid on the division plate of a second trough or vessel placed immediately under the first, and constructed in every respect the same. It is obvious that the liquid will be more oxygenated the more tubes and superposed troughs or vessels it passes through."

[Printed, 9s. 2d. Drawings.]

A.D. 1864, April 29.—N° 1088.

HILLS, Frank Clarke.—" Improvements in the purification " of gas, and in obtaining a valuable product in the process; and " for the preparation of some of the materials to be used in " the said purification." These are said to be, first, " the use of " persulphate of iron or protosulphate of iron or a mixture of " both of these salts, combined with precipitated sulphate of lime " or sulphate of magnesia, for the purpose of purifying gas." In carrying out the above, the whole of these materials are " absorbed " into or mixed with sufficient sawdust, spent tar, breeze or such " like porous matter, to make an open material easily permeable by the gas, and placed on the trays of dry lime purifiers." When the material will no longer purify the gas it is taken out of the purifier; it then contains " a large quantity of sulphate of " ammonia," but to make it still richer in this salt, it is spread out and exposed to the air to oxidize the iron of the sulphuret and sulphuric acid added to it, so as to " reform in the material, either " partially or wholly, the same salts that were in it at first." It is then used again for purifying the gas, and when saturated, it may be treated as above and renovated " until the material " becomes sufficiently charged with sulphate of ammonia."

Porous bodies described in No. 12,290 used for absorbing ammonia, and any material composed of sulphate of ammonia and porous materials are treated as above until they become " charged " with sulphate of ammonia as much as desired." Sulphate of ammonia, crystallized, may be repeatedly made into a damp material with sulphuric acid; and other absorbent substances may be treated in the same way with acid, and used over and over again as above, but it is preferred to use the salts of iron material as first described.

Second. " The manufacture of the said salts of iron from the " spent oxide of iron that has been used to purify gas, after the " sulphur has been burnt off from the said oxide of iron." If the oxide of iron " has acquired much impurity, such as sandy or " earthy matters, they should be separated from it " by stirring it in a stream of water, it will be floated off by the water, " and the " impurities will remain at the bottom of the vessel." When the oxide is tolerably pure, sulphuric acid in a pan or in a reverberatory furnace is used to form with it the sulphates of iron. The acid acts quickest if the oxide is reduced to the metallic state, or the state of protoxide by heating it with powdered coals or other carbonaceous matter in a closed furnace or retort. An excess of acid is used which is afterwards "neutralized by lime or chalk, so "as to make about 20 per cent. of sulphate of lime in the mixture." The "impurities may be separated by means of a sand "filter from the solution of the salts of iron formed."

[Printed, 4d. No Drawings.]

A.D. 1864, May 9.—Nº 1174.

MILLAN DEL REAL, DON FRANCISCO MARQUES.—(*Provisional protection only.*)—"Improvements in extracting silver from "lead." These are as follows:—The lead from which the silver is to be extracted is run from the reverberatory furnace into a heating pan or pans previously heated, so as to raise its temperature in a short time. The surface of the lead is then skimmed, after which about 1 part by weight of carbonate of ammonia is added to every 100,000 parts by weight of lead, by means of a perforated ladle with a lid; after well stirring the lead for about five minutes the ladle is withdrawn, and 1 part by weight of sea salt to about 10,000 parts by weight of lead, is introduced by the same instrument with stirring for about ten minutes. If the quantity of silver contained in the lead is very high, then a proportionally greater quantity of sea salt is introduced. The surface of the lead is skimmed, and the skimmings placed in heaps to be afterwards distilled. After this skimming is completed, zinc is introduced into the lead by means of an instrument similar to the one used above, about 1 per cent. at a time, until the desired quantity has been added; the fire is then withdrawn, and the furnace door is left open, in order that the lead may be cooled as quickly as possible. On the surface becoming crystalline it is removed and placed in heaps for distillation in a retort in layers with vegetable charcoal. "After maintaining the fire for "about two hours, the zinc which was contained in the silver and "lead introduced into the retort will be found in the chambers of "condensation in connection with the retort in the state of oxide "of zinc."

[Printed, 4*d*. No Drawings.]

A.D. 1864, May 9.—Nº 1178.

NEWTON, ALFRED VINCENT.—(*A communication from Leopold Wiart.*)—"Improved apparatus applicable to the heating and

" evaporating of fluids." This it is stated is "a novel arrange-" ment of steam generating apparatus," which is applicable to a number of purposes, among which are named the "crystallization " of salts." It consists of "rows of tubes contained within " furnace walls, and pendent from horizontal metal channels or " chambers, which are supported by the walls. The apparatus " is divided into three compartments by transverse walls. In the " first compartment, which is the steam-generating compartment, " a furnace grate is fitted immediately below the pendent pipes " to receive the fire for heating the fluid to be evaporated. At " the upper end of the division wall is an opening to allow of the " flame and gases of combustion entering the second compart-" ment, in which the feed water is heated, and at the lower part " of the second divisional wall is an opening through which the " gases of combustion pass to the third compartment, where the " superheating of the steam is effected. Around the pendent " tubes of the three sets the flame and heated gases are free to " circulate." "In order to ensure an efficient circulation within " the tubes they are each fitted with a concentric tube pendent " from the steam-tight cover of the chambers or channels before " mentioned, or rather from the central horizontal partition of " such chambers or channels, they being divided into two parts." " The upper division of the chambers or horizontal channels of " the second compartment connect with a water supply pipe, and " the water flowing from this pipe descends through small pen-" dent pipes, and passes out at their lower ends into the outer " tubes, up which it rises, and in rising becomes heated. The " heated water passes upwards to the lower division of the " channels, and escapes by a pipe which leads to a horizontal " cylindrical vessel mounted outside the furnace; this vessel con-" nects by pendent pipes with the upper division of the channels " of the first compartment, and the mouths of these pipes are " governed by float valves within the cylinder. From the upper " division of the channels the water descends into the inner pipes " of the first or steam-generating series, and finds its exit into " the heated tubes or pipes above the furnace fire; here the water " is rapidly converted into steam, and the steam rising up the " pendent tubes discharges into the lower division of the channels. " From there the steam is led off by a pipe to the third compart-" ment or superheater, where it enters the lower division of the " channels, passes down the outer tubes, and up through the

" inner tubes to the upper division of the channels which com-" municate with a steam supply pipe. By this means a constant " supply of superheated steam may be readily obtained and kept " up with great economy of fuel."

[Printed, 1*s*. Drawing.]

A.D. 1864, May 11.—N° 1196. (* *)

GISBORNE, Thomas Matthew.—" Improvements in kilns for " burning bricks, tiles, and other earthenware or ceramic articles, " limestone, and ores." A number of kilns so constructed that " the combustion of the fuel takes place at the one end, whilst the " chimney communicates at or near the floor with the other end," are combined in such wise that the " chimney end of one kiln can " communicate at pleasure with the " " combustion end of another " kiln, or with a separate chimney or flue." The kilns are constructed to taper from the combustion end to the chimney end " side by side, and alternately in reversed positions," disposed either in parallel lines or in a circle. The aperture through which they all communicate is provided with a damper, " which, when " the kilns are burning on the continuous system, is removed, " whilst the chimney or flue is then closed." " When the kilns " are required to burn separately the communications between " them is closed " by the damper and the chimney opened. The products of combustion from the kiln that is being fired can thus " pass among, and heat the contents of one or more kilns that are " going to be fired," while " the air for supporting the combus-" tion in the kiln that is being fired " can pass through " the " contents of one or more kilns that have been fired."

[Printed, 1s. Drawing.]

A.D. 1864, May 25.—N° 1296.

JONES, Benjamin.—" Improvements in the mode or method of " obtaining sulphur from alkali or blue waste." These are as follows :—Into a digester with a false bottom about two tons of alkali waste are put, and steam is introduced beneath the false bottom by a tube covered with a cap. As soon as the contents become heated to about 200° F. the cap is removed from the central tube, and hot or cold water is caused to flow upon the heated matter, and continue the steaming or if steam be not convenient, the heat of a fire is applied to the vessel till the liquid is in active ebullition, but the use of hot water and steam is preferred. The steam or heat is cut off, and the liquor filtered through the false bottom is allowed to settle, and is drawn into a precipitating vessel. The partially exhausted waste in the digester is submitted to air or air and steam together, and treated again as above with water and steam or heat, and the liquor drawn off, and the residue "removed from the digester may be placed in a " heap, and after a given time may be reworked to obtain any " sulphur which it may retain." To "the clarified yellow liquor " (usually from 6° to 10° Twaddell)" add "about one hundred " weight of acid of 30° to 32° Twaddell to the liquor obtained " from each ton of blue waste," or until the liquor is feebly acid to litmus. The liquor heated from 180° to 212° F., both before and after adding the acid, hastens the precipitation of the sulphur. The supernatent liquid is drawn from the precipitated sulphur which may be pressed into blocks or otherwise, and dried.

[Printed, 4*d*. No Drawings.]

A.D. 1864, June 1.—N° 1362.

WARD, **Frederick Oldfield**.—"Improvements in the manu" facture of chromic acid and chromates." These are, "treating " chrome ores in the furnace in conjunction with fluorine, in the " form of a fluoride, preferably calcic fluoride, when operating upon " the said ore for the purpose of developing therefrom chromic " acid or chromates." "The fluoride employed, preferably fluor " spar, should be reduced to fine powder, and intimately blended " with the pulverized chrome ore, and with the other ingredients " of the mixture to be furnaced, in each case (according to the " particular chrome process adopted). The fluorine thus intro" duced into the mixture acts as a flux, promoting and accele" rating the reaction of the materials, and reducing the temperature " of the operation. The furnace product thus obtained may be " lixiviated in the usual way, and the product of lixivia" tion may go through the usual processes of purification, " crystallization, and so forth, to fit it for the market." It is stated that as chrome ores are so variable "the proportion of " fluoride varies in each case according to the quality of the ore " treated." "In the case of each quality of chrome ore, a few " preliminary crucible trials" are made, "beginning by adding to " the chrome *ore one*-twentieth of its weight of good soft fluor "spar, and varying this proportion up and down" until, on comparing the results of the trials, it is seen "which proportion "accomplishes the most considerable reduction of temperature, "coupled with the most complete and rapid conversion of the "cromic sesquioxide into chromic acid."

[Printed, 4*d*. No Drawings.]

A.D. 1864, June 2.—N° 1374. (* *)

CLARK, William.—(*A communication from Henri Adolphe Archereau.*)—"Improvements in the mode of heating animal, "vegetable, and mineral matters," applicable to the distillation and coking of wood, peat, petroleum oils, coal, bones, and other organic substances; to the preparation of oxygen, carbonic oxide, carbonic acid, and other gases; to the reduction of oxides of iron, and the ores of other metals; to the heating and melting of metals and alloys; to baking bread; and to burning lime, plaster, cement, and similar substances.

The materials to be treated are heated "in closed vessels "without contact of atmospheric air," and the volatile matters evolved from the materials themselves are used "almost exclu-"sively" as "vehicles of the heat to be communicated." These volatile portions of the substances under treatment, as they are driven off by the application of the heat, are conducted into superheaters, "and thence into the closed vessels" "filled with "the substances to be acted upon." From thence they sometimes pass "into a refrigerator suited to the condensation of the "vapours to be retained," and then the non-condensible portions are made to pass back into the superheater in order to be there utilized. The remaining vapours may also be taken into other refrigerators, and thence either into a furnace or a gas-holder.

In this verbose Specification are enumerated more than fifty-three applications of this "system." Apparatus for distilling wood or coal; a blast furnace; and a "kiln for heating, baking, "or distilling plaster, coal, and other materials;" are more specifically described and illustrated in the drawings. In the distilling apparatus, a serpentine cast-iron pipe contained within a brick casing is shown heated by the fire gases from a furnace outside. Beyond this is another brick compartment, containing "the wood to be raised to distilling heat," and the gases from which escape through pipes, communicating with the serpentine pipe first mentioned, and with another similar pipe, constituting

" the condenser." If the gases are conducted into the condenser only, the uncondensed portions are re-conducted back to the superheater. This condenser may communicate with "other " refrigerators, and if needed to one or more" other superheaters. Jets of steam or of compressed gas, or fan blowers, are used to produce the required circulation of the gases. In the second form of distilling apparatus, small coal is shewn "laid upon arches and " between hollow coke walls" contained in the distilling chamber.

The blast furnace is in connection with "a turret filled with " helical flues, in which circulate the products of combustion from " the fuel." Several of these superheaters may be used. A chimney, with an adjustable damper, and a furnace below, are connected with the superheater here shewn. The channel communicating with the blast furnace is "at such height as that it " may be possible to collect in the blast furnace the gaseous oxide " of carbon." It is furnished with a damper, and a tuyere behind it is for "introducing oxide of carbon at a sufficient pressure " for effecting the circulating motion of the gases in the blast " furnace and superheater." At bottom is another channel "for " establishing further communication between the reheater and " the blast furnace," and it also has a damper. At the top of the furnace are pipes for conveying away the surplus gases to boilers, gas-holders, or refrigerators; and these gases may also be conveyed to the tuyere for establishing the required circulation.

The system is similarly carried out in connection with the kiln. The superheater is heated from a flue furnished with a damper, and conducting the waste heat or the gases from a furnace; and it is constructed on the same plan as that for the blast furnace. At the top of the kiln is a door, and the materials are piled on a grate, at about the level of which is a discharging door. At the upper part of the kiln is a channel communicating with the upper part of the superheater. This channel is furnished with a damper, and a tuyere for injecting the carbonic oxide. The lower channel opening between the kiln and the superheater is partitioned into two parts, "so as to cause the gases to traverse the superheater " either" into the base of the kiln or into the chimney according to the position of a damper. Below the kiln is a channel leading to a refrigerator. It is also fitted with a damper, in order, when required, to let the gases out at a chimney instead of into the refrigerator.

[Printed, 2*s*. 2*d*. Drawings.]

A.D. 1864, June 2.—N° 1375.

WARD, **Frederick Oldfield**.—"Improvements in processes "and apparatus for treating alkaliferous minerals to obtain alkalies, alkaline salts, alumina, and accessory products." These are said to be, first, "selection, apportionment, and coagglutination of the materials used" in this process. The proportion of the lime in the mixture of lime, chalk, and water employed was formerly indicated by the patentee to be "one equivalent, each "of lime and chalk, or (by weight) 28 of the former and 50 of the "latter;" now it is recommended to use "from 14 parts to so "little as one part of lime (by weight) against 50 parts of chalk," using chalk and limestone conjointly (instead of chalk only) in this process. Replacing "part of the ordinary calcic hydrate or "carbonate" in this mixture, "whether in powder or compost, by "an equivalent proportion of the calcic residuum of the cryolite "process, *i. e.*, of the process for obtaining soda and alumina "from the mineral so called;" utilizing "cryolite itself first as a "fluorine source in lieu of calcic fluoride, and secondly, as a contributory of alkali and alumina in aid of the yield" of this process. Adding "pulverized chrome ore to either of the mixtures" employed; the object being "to fix the potash liberated "from the rock in the form of a valuble salt, the chromate," and prevents "the loss of potash by volatilization."

Second, the "comminution of the materials used," in this process by "the use of sieves of different meshes, the coarser to sift the chalk, the finer to sift the alkaliferous rock." Good results have been obtained "when using for the chalk sieves having 26 "holes to the linear inch, and for the alkaliferous rock, sieves "having 90 holes to the linear inch." When employing "wet "grinding and livigation for the comminution of the chalk, this "improvement does not apply."

Third, "mixing of the materials used" in this process, wet mixing, "by mechanism of the nature of a pug mill constructed "so as to squeeze while cutting up and mixing them, so as to "deliver them in the form of a plastic compost." Dry mixing, "by means of a hopper and sieve or sieves, suitably arranged, and "shaken to receive and intermix materials and deliver them "in the form of powder." "In both systems, wet and dry, "the replenishment and evacuation of the mixing apparatus "should go on simultaneously and continuously by the adaptation of ordinary arrangements to that end."

Fourth, "subdivision and desiccation" of the aforesaid compost. This is "best accomplished by first drying the moist pug mill "product, then breaking it to pieces, preferably of about hen's-"egg size or thereabouts, and finally screening the mass through "a screen of suitable mesh to retain the pieces required and to let "the smalls and dust fall through." Subdividing the compost into masses of determinate form and size by "moulding by im-"pletion and moulding by expression." The substance being of "peculiarly adhesive character," the impletion mould is lined with a fabric "having a pile like plush or velvet to admit air "freely." "The expression die is fitted with side rollers to "diminish friction." "The perforation of the masses may be "accomplished on either system by apparatus similar to that in "use for making perforated bricks for building purposes." In dessicating gradually, employing "closed drying sheds fitted with "a double system of pipes or flues for the artificial supply of "warm air and the artificial withdrawal thereof, charged with the "water of admixture of the compost," or by a gentle heat "when "already arranged in the kiln or furnace itself."

Fifth. Ignition of the materials whether in compost or in powder "by differentiating the conditions, physical or chemical, or both "physical and chemical, of different portions of the same charge "respectively destined to occupy hotter and cooler places in the "kiln or furnace.

Sixth. "Adaptation of kilns and furnaces to the purpose" of this process. "Vertical kilns charged, discharged, and fired on "the principle of the ordinary continuously-working lime-kiln "are available" for this purpose, and are improved "by con-"structing them with a larger than the usual number of drawing "holes below, as also in some cases by adding a dome-head and "chimney above;" both drawing holes and chimnies having dampers. Several other kilns, which are generally modifications of this, are described, as also a *gas* furnace and reverberatory furnaces. "The waste heat of all these furnaces and kilns may be "utilized by conveyance beneath drying floors, or evaporating "pans, or through drying sheds, to prepare the materials, or "boil down the products of the process."

Seventh. "Lixiviation of furnace product." The ordinary serially arranged pans are made of a circular form and fitted each "with a perforated basket to hold the larger lumps of frit, an "agitator below the basket to stir the smalls," and "a steam "*pipe or other equivalent* arrangement for heating the liquor of "lixiviation." The addition of lime or of carbonated or caustic alkali or "of two or more of these to the liquor of ebullition or "lixiviation during the aqueous treatment of imperfectly or "excessively fretted material augments often very sensibly the "yield therefrom."

Eighth. The "purification of the alkaline products and recovery "of ingredients separated therefrom as useful lye products." By aerating "the lye with common air in fine streams to eliminate "iron and to obviate its falling in association with alumina," treating the lye afterwards "with carbonic acid to precipitate "alumina in a proportionately purer state." Using the carbonic acid given off by the ignition of the materials or by the fuel, washing it when impure with sulphurous acid, &c. in a coke tower with water. "Potassic sulphate and sodic carbonate, when sufficiently abundant in the lye to justify separation, may be eliminated by usual chemical means."

Ninth. "Utilization of the residuum." The lixiviated residuum to serve in some cases as a material of cement, in other cases as a material of bricks. In the first case it is mixed with "material of "septarian origin, and of the character of that employed in conjunction with chalk in making artificial cements." "In the "second case of siliceous material, preferably of the more soluble "kinds, like that found under the chalk beds at Farnham."

[Printed, 10*d*. No Drawings.]

A.D. 1864, June 6.—N° 1401.

NAPIER, JAMES.—"Improvements in separating certain metals "and metallic substances from ores and other matters." These are, in reference to this subject, as follows:—The ore broken in pieces is heated to redness in a vessel or retort, and when at that heat or while being heated to redness a current of ordinary gas is passed over it. "The gaseous product which comes off may be "burnt, and the products of combustion led into a chamber for "making sulphuric acid." But what is preferred is to "lead the "gaseous products into a reservoir or gasholder, from this it is "pressed out," and one-third burned, and the products of combustion led into a chamber into which "the remaining or unburnt "two-thirds of the gaseous sulphide" is allowed to pass, and thus a *deposit* is obtained of sulphur which is collected. "When the "*metallic* substance in an ore or mixture is in a state of oxide or "*carbonate* which is volatile at a red heat," and it is wished to obtain such oxide free from mixture, it is treated "by passing " steam or hot air (but preferably steam) through it in a close " vessel."

[Printed, 4*d*. No Drawings.]

A.D. 1864, June 6.—N° 1408.

CLARK, William.—(*A communication from Emmanuel Adrien Lesieur.*)—"Improvements in the preparation of phosphates of " ammonia and ammoniaco-magnesian phosphate." These are, first, preparing acid phosphate of ammonia by treating bones, nodules, or coprolites with "hydrochloric or sulphuric acids in " the ordinary manner, and further precipitating the resulting " liquors by means of sulphate of ammonia," and thus obtaining an "acid phosphate of ammonia, which has never before been " prepared in this manner." When tribasic phosphate of lime is " treated with hydrochloric acid, biphosphate of lime and chloride " of calcium" are produced, which treated with sulphate of ammonia give sulphate of lime precipitated, and "a solution " of biphosphate and hydrochlorate of ammonia which are separated by crystallization." When sulphuric acid is employed in place of hydrochloric, "insoluble sulphate of lime and biphosphate " of lime" are produced, this biphosphate separated from the sulphate and treated with sulphate of ammonia, gives "biphosphate " of ammonia and phosphate of lime." Biphosphate of ammonia obtained by either of the above methods, may be "transformed " into neutral or tribasic phosphate, by saturating it in caustic " ammonia or carbonate of ammonia in certain determined proportions."

Second. Making ammoniaco-magnesian phosphate by boiling the above solution of biphosphate and hydrochlorate of ammonia with magnesia or carbonate of magnesia, the ammoniaco-magnesian phosphate precipitates and is collected. It is also prepared by boiling biphosphate of lime obtained as above, with hydrochlorate of ammonia and magnesia, the salt precipitated is collected.

[Printed, 6*d*. No Drawings.]

A.D. 1864, June 16.—N° 1498.

OZOUF, George Hyacinthe.—"Improvements in the manufacture and utilization of carbonic acid, and in apparatus

" connected therewith." These are, the manufacture of "pure " carbonic acid" employing it in the "preparation of white " lead," "gaseous liquids," and "alcaline or other carbonates " and bicarbonates," as follows:—1st, by employing "a furnace " with grate and ash-pit, or a lime furnace or kiln; 2nd, of " several hermitically closed cylinders, communicating with one " another provided with agitators, and the last one with a " chimney; 3rd, of a wood reservoir; 4th, of distilling vessels " and refrigerators; 5th, of serpentine coils for the circulation of " steam at a temperature of about 296° Fahrenheit; 6th, of " pumps for forcing in air and liquids; 7th, of a gasometer." The object of the "invention is to separate the carbonic acid " from other gaseous products proceeding from the combustion of " coke, charcoal, anthracite and other materials, and from the " burning of lime, and is based on two known chemical proper- " ties; first, on the facility with which soda and potash combine " in excess with carbonic acid, to produce bicarbonates; second, " on the property they possess of losing this excess of carbonic " acid at a temperature of 212° Fahrenheit." The carbonic acid and other products from the combustion of the above named substances, is led by means of suction and force pumps into closed cylinders "three-quarters filled with solutions of sub-car- " bonates of soda or potash, and provided with winged stirrers." These cylinders communicate with each other by **S** shaped tubes; the last cylinder has an exit pipe for uncombined gases. The solution of bicarbonate formed is pumped into a distilling receiver when it is heated, to drive off its excess of carbonic acid which is collected, and the carbonate of soda is returned to be re-carburated. The "pure carbonic acid" produced as above, is employed among the other purposes above named in the manufacture of white lead. "The operation is carried on in vacuo, and conse- " quently, by means of absorption." The invention may be said to consist "in an alternate and continuous composition and decom- " position of bicarbonate of soda or potash to obtain carbonic " acid, and to apply it as before described."

[Printed, 10*d*. Drawing.]

A.D. 1864, June 17.—N° 1509.

JOHNSON, JOHN HENRY.—(*A communication from Madame Rosine Saiglan Bagnères.*)—"The manufacture of lyes or liquors

" applicable to the cleansing and bleaching of wool and other " fibrous substances as well as of textile fabrics." In making the above it is preferred to employ the mineral substance called glauberite, which " is first pulverized and mixed in any suitable pro- " portions with pulverized charcoal and pure or argillaceous " limestone or chalk," and the mixture is " calcined in crucibles " or in reverberatory furnaces, or by any other convenient method, " until a substance is obtained which the inventor terms ' sulpho- " ' sodalite,' and which is treated with boiling water until all " soluble constituencies are dissolved out. The liquor is then " concentrated," and is said to consist of " sulphuret of sodium in " large quantities, a little carbonate of soda, silicate of soda, and " aluminate of soda." The best results have been obtained with the following proportions, " one ton of globerite dried in the sun " or roasted, one ton of vegetable or other charcoal, and one and " a half tons of chalk or limestone more or less pure, or a little " argillaceous."

[Printed, 4*d*. No Drawings.]

A.D. 1864, June 17.—N° 1513.

TOOTH, William Henry.—" Improvements in furnaces or " apparatus for generating carburetted hydrogen, carbonic acid, " carbonic oxide, and cyanogen gases." These are as follows :— " A large chamber, having a wrought or cast-iron outer casing " lined with fire-bricks or other suitable material," is " divided by " a perforated dome or arches, placed two or three feet from the " bottom, into two compartments consisting of an upper and " lower compartment. A suitable number of fire-places, according " to the size of the furnace, are placed along the outside of or " near the bottom of the chamber, so that the heat and gases " generated in the fire-places will completely envelope the inner " chamber, and will decompose the atmospheric air supplied to " produce combustion in the fire-places." " The fuel in the fire- " places is separated from the lower chamber by bridges which " cause the flame and gases from the fire-places to ascend and " thoroughly commingle together, and produce complete combus- " tion (as nearly as possible) before descending over the bridge " into the lower chamber, and passing through the perforations " into the upper chamber. The upper chamber is fitted with " valves at the top and doorways in the sides for charging and

" discharging. It is also provided with suitable pipes and valves " from which the gases can be conveyed away to gasholders, " reservoirs, or exhausters, or to the furnaces where it is to be " employed." To produce carburetted hydrogen for lighting, or combined with carbonic acid to be used in smelting, the upper chamber " is charged with coals until it is about four-fifths full." The fire-places are charged with coals or coke, and a blast is forced into them and the valves are regulated. To manufacture cyanogen the carbonaceous matters are saturated with a solution of an alkaline carbonate and dried.

[Printed, 10*d.* Drawing.]

A.D. 1864, June 21.—N° 1538.

PUGHSLEY, WILLIAM JOHN.—" Improvements in obtaining " sulphuric acid from the refuse 'pickle' used in tin plate works, " and also from sulphate of iron or 'green copperas.'" The used or refuse pickle is evaporated and crystallized, the mother liquor drawn off from the crystals is evaporated a second time and crystallized, and the mother liquor is drawn from the crystals and again concentrated " to a sufficient strength to be used as 'pickle' " for cleaning the iron plates for the process of tinning." " For " extracting the sulphur from the crystals," above which are " sulphate of iron or 'green copperas' and converting the same " into sulphuric acid or oil of vitriol," the copperas is distilled in a retort, " the sulphur escapes into a leaden chamber or con- " denser in communication with the retort where it condenses," and " proceed to convert the same into sulphuric acid or oil of " vitriol in the usual manner. The refuse left in the retort is pure " oxide of iron."

[Printed, 4*d.* No Drawings.]

A.D. 1864, June 21.—N° 1545.

FORBES, JAMES.—" Improvements in the means of and appa- " ratus for manufacturing sulphate of ammonia and sulphuric " acid." These are said to be, " in the manufacture of sulphate " of ammonia and sulphuric acid from or by means of the agency " of sulphuretted hydrogen gas disengaged during the process of " saturating sulphuric acid with ammoniacal vapour."

" From a suitable reservoir or feed head elevated above the apparatus a supply of ammoniacal liquor is obtained, which liquor is conducted through a series of horizontal pipes connected end to end to a column or still, the liquor flowing down from the various surfaces of the still, and becoming heated and transformed to the gaseous state by means of steam at high pressure supplied to the lower part of the still. These horizontal conducting tubes are encased or surrounded by larger tubes, their junctions being effected by right-angled tubes and flanges. The lowest of these enlarged tubes communicating with a worm in a water condenser, which worm continues below into a receptacle for the condensed liquor. From this receptacle a pipe is connected with a sulphur furnace, by the side of which is a nitre furnace, from each of which a vertical pipe conveys sulphurous acid, sulphuretted hydrogen, and nitrous acid, respectively, into a horizontal pipe and thence into a vitriol chamber above and beyond them, such chamber being supported by suitable standards and framing.

[Printed, 10*d*. Drawing.]

A.D. 1864, June 24.—N° 1596. (* *)

CHAMBERLAIN, Humphrey, CRAVEN, John, and WEDEKIND, Hermann.—(*Partly a communication from Frederich Hoffmann.*)—"Improvements in kilns or ovens for burning bricks, "tiles, pottery ware, limestone, cement, and other substances." They relate to the kiln "for which Letters Patent were granted "to Alfred Vincent Newton, as agent for the said Frederich "Hoffman, N° 2918, A.D. 1859."

A kiln is constructed in a long straight line; at one end is the fire-place, and the opposite end opens into a chimney. In the roof of the kiln are made a number of openings with covers, from which the fuel is to be introduced into the kiln amongst the goods being burnt. The entire length having been filled with bricks, a fire is lighted in the fire-place, and when the end of the kiln is sufficiently heated, fuel is introduced from the openings in the top, advancing gradually from the fire-place to the chimney. The air as it enters thus, first passes through the burnt bricks, cooling them down, and conveying their caloric to the bricks in front. The kiln may also be subdivided into compartments to be used "as drying chambers, whilst the other portions of the "kiln is burning." The hot air is brought "from the cooling "portions of the kiln" by means of a movable pipe adjusted to any of the holes in the roof, and when the bricks are sufficiently dry the doors and flue may be removed.

Pottery kilns are built in several compartments, with a chimney in common, and a flue opening direct into the chimney from the last compartment of the series. The fuel can be introduced from the roof into a fire-place for each compartment except the front one, which is supplied from a door. A fire is lighted in the compartment the farthest from the chimney, and the products of combustion pass through all the compartments on their way to the chimney. The next compartment is then fired, and its supply of air passes through the first compartment, and so on till the last compartment nearest the chimney is reached. Kilns so constructed may be transformed into a continuous kiln, as specified in Patent Nº 2918, A.D. 1859.

The second part of the invention consists in so constructing a continuous kiln that warm air may be taken from any of the heated chambers "to any of the other chambers, for the purpose " of drying green bricks." The kiln can be divided into a number of compartments, each provided with a door for the introduction of the goods. From each compartment there extends a flue from above, opening into an annular smoke chamber surrounding the chimney in the centre. The inlet orifices of the flues are regulated by a valve. These flues can be connected to the annular passage, which itself can communicate with other flues "which " lead from the lower portions of the compartments of the kiln " to the smoke chamber." Supposing the kiln to contain 12 chambers, and designating each one by a numeral, we may assume that chambers 3 and 4 are shut off from the others by doors made for the purpose, and that these two chambers contain green bricks. Chamber 5 is being filled while chamber 6 is being emptied. Chambers 7, 8, 9, and 10 contain burnt goods in the act of cooling, "whilst the chambers 11 and 12 are being fired." The hot air thence passes through the goods in the chambers 1 and 2, and being kept from entering directly into 3 and 4, passes by the bottom flue into the smoke chamber, and thence to the chimney. The fresh air enters by the doors of 5 and 6, and runs round through the chambers 7, 8, and 9. A portion of this air passes through the chambers 10, 11, 12, 1, and 2, and thence by the flue leading from the lower part of that compartment to the chimney. Another portion enters one of the flues which lead from the upper part of each compartment, and as the valve on its end is closed, and the plug leading into the annular chamber is open, it enters the latter and traverses through the open valve in the flue into the chamber 4, and thence into 3. It finally escapes by the flue leading from the upper part of compartment 3 into both the smoke chamber and chimney. By opening and shutting a fresh set of dampers the operation can be repeated with other compartments.

The third part of the invention consists in providing a separate collecting flue and chimney for carrying off the steam evolved in drying green goods. "A separate steam collector" communicates by passages with a steam chimney built inside the smoke chimney. The hot air for drying the bricks enters the chambers in the way employed in carrying out the second head of the invention, but instead of passing off with the steam into the smoke chamber, they are first conducted into the steam chamber, and thence into the internal chimney. The products of combustion pass off from the smoke chamber into a chimney surrounding the steam tube.

In burning pottery a closed chamber may be built inside each compartment, but with a free passage along the sides and under the bottom. In burning limestone an arch is built so as to extend downwards from the roof between each compartment; or the chamber is composed of side walls only, with arches at intervals, the substances being covered over by loam and earth. With materials subject to fusion under great heat, the fire-places are "enclosed in an open setting of fire bricks or tubes."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1864, July 9.—Nº 1705.

MOUTIÉ, JEAN JOSEPH.—(*Provisional protection only.*)—" Im-
" provements in distilling apparatus suitable for rectifying, sepa-
" rating, or combining with other suitable matters, benzol,
" petroleum, or other more or less volatile hydrocarbons or their
" derivatives, concentrating acids, treating alcoholic products, or
" other similar purposes." These consist of "a cucurbite for
" the products or materials to be distilled;" to this cucurbite is
connected the lowermost tube of a "series or system of inclined
" tubes slanting alternately in opposite directions to each other,
" and connected by means of small narrow ajutages or branch
" pipes into one continuous zig-zag conduit, the lower end of
" which opens into the cucurbite, and the upper end either into a
" refrigerator or into the cucurbite of a second apparatus similar

" to the one just described." The apparatus is to be made of material " according to the nature of the products to be treated, " and is provided with suitable stop-cocks, branch pipes, and " other required appendages."

[Printed, 4*d*. No Drawings.]

A.D. 1864, July 14.—Nº 1766.

BROOMAN, RICHARD ARCHIBALD.—(*A communication from Cyprien Marie Tessié du Motay and Edouard Karcher.*)—" Improvements in the manufacture of fluoride of silicium." These are, " by dissolving [fusing ?] in a closed crucible furnished with " tubes, in presence of carbon, an intimate mixture of 11 equivalents of silica, and 18 equivalents of fluoride of calcium," there are obtained, " 4 equivalents of fluoride of silicium, 66 per cent. " of the fluorine contained in the fluoride of calcium," and " 6 " equivalents of oxide of carbon ;" " by proportionately increasing the quantity of silica and of carbon without increasing the " fluoride of calcium, and by adding to the mixture to render it " fusible, a corresponding proportion of aluminous earth ;" there is obtained under the same circumstances " " 88 per cent. of the " fluorine in the fluoride of calcium employed." On a large scale, blocks are made containing 11 equivalents of silica, 18 of fluoride of calcium, 30 of carbon, and 4 or 5 parts of aluminous earth ; they are dried, and fused in a retort or " cupola, fitted at " its mouth with a condensing apparatus for transforming the " fluoride of silicium produced into hydrofluo silicic acid."

Blocks containing 11 equivalents of silica, 18 of fluoride of calcium, and 4 or 5 parts of aluminous earth, are fused in an iron blast furnace by adding to each charge of blocks a sufficient quantity of coke or other fuel.

[Printed, 4*d*. No Drawings.]

A.D. 1864, July 23.—Nº 1833.

HALL, DENNIS, and ROOSEN, AUGUST LUDWIG.—" Improvements in the manufacture of salt." These are said to be, " the application of surface heating for the evaporation of brine," in " the manufacture of salt."

A salt pan, or a range of salt pans, of a circular or any other suitable shape, of brick or other suitable material," are covered " either partially or entirely with a brick arch or otherwise, to "prevent radiation of heat from the brine." "At one end of "the salt pan or pans a furnace is erected, consuming as perfectly as can be obtained, its smoke;" the heat from such furnace is allowed to "pass over the surface of the brine instead of "passing under the salt pan or pans as has hitherto been customary. The steam evolving from the evaporating brine, together with the products of combustion, may then serve to "heat one or more open salt pans in the usual manner." In combination with the above it is proposed to use the "known "machinery for raking the salt pan under the cover into the "pockets."

[Printed, 8*d*. Drawing.]

A.D. 1864, August 23.—Nº 2076.

BOGGIO, Gerin Gabriel.—"A new or improved process for "extracting the oil contained in the flour of oleaginous seeds, for "distilling, rectifying, and evaporating volatile substances, for "preparing volatile oils or essences and extracts for dyeing and "medical purposes; for dessicating animal and vegetable alimentary substances, plants, roots, and flowers, and for ventilating." The apparatus described for the above purposes, among other things, may be employed in distilling or rectifying "vinegars, acetic acid, and similar substances." These are placed in vessels which are put "in communication with the "suction valve of a pump chamber or with a bellows with suction "and forcing valves worked in the ordinary way," when, a vacuum being formed, vaporizes the acid, "which is received in a "state of vapour in the pump chamber or bellows, and driven "from thence by the forcing valves into a serpentine or other "condensing apparatus." "The recipient which receives the "condensed vapours may be so graduated as to show the quantity "distilled."

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 6.—Nº 2175.

LEATHER, John Knowles.—(*A communication from Benedict Margulies.*)—(*Provisional protection only.*)—"Improvements in "the manufacture of salts of chromium from chrome ore." It is stated that hitherto chrome ore finely divided has been mixed with lime or its hydrate "or other alkaline earths or feldspar, with

" or without one or more of the salts of potash or soda, and with " or without manganese or other oxygen bearing material," and the mixture spread on the bed of a reverberatory furnace, so as to expose as large a surface as possible to the action of the heat; but this process is precisely opposite, and is as follows:— In preference, equal quantities of lime or its hydrate or of other alkaline earths, and of one or more of the salts of potash or soda, and of chrome ore reduced to a finely divided state, with or without feldspar, and with or without manganese or other oxygen bearing material, " are mixed together, and the mixture formed " into blocks, in preference " in the shape of a cone eighteen " inches high, eight inches wide at the top, and nine inches wide " at the base." It is also preferred " to use a mixture of hydrate " of lime and sulphate of potash, or sulphate of soda and chrome " ore, and after well mixing them in any convenient manner to " add water, and knead it till it possesses the consistency of clay," when it is pressed " into moulds of a conical shape," and the blocks are exposed " to the heat of a furnace till the chrome ore " is either wholly or partially decomposed," the blocks are then placed in a vessel to dissolve out the salts of chromium, and the solution is treated " by any of the usual methods for the manu- " facture of chrome salts."

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 16.—N° 2270. (* *)

CRAMPTON, THOMAS RUSSELL.—(*Provisional protection only.*) —" Improvements in kilns used for drying, burning, and cooling " bricks, tiles, lime, cement, and other articles." An annular kiln is divided into a number of parts, each of which can communicate with or be separated from each one of two chimnies. Dampers are so placed as " to allow the external atmosphere to enter the air space between the outer walls." Towards the bottom, " holes with moveable covers are made through the outer " walls" for introducing the fuel. Each division has a doorway for taking in and out the articles to be dried. The air heated by cooling the goods in one division " is used for supporting the " combustion in other divisions," and it passes either directly from one division of the kiln to the next, or by a partition it is deflected downwards or upwards, and passes through apertures in the bottom or the top of the kiln into the division next that where fuel is being burnt, " and into which the products from the

" fuel pass." The order in which the different divisions are set to work may be varied, but one particular mode is here described.

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 19.—N° 2294.

BROOMAN, Richard Archibald.—(*A communication from Edouard Aubertin.*) — " Improvements in the manufacture of " phosphuret of iron, phosphate of lime and alkaline phosphates." These are as follows:—" If silica, iron, and coal be added to " phosphate of lime, the proportions of these several substances " being combined in such manner that the silica can form with " the lime a fuseable silicate, and the coal be in sufficient quantity " to reduce the phosphoric acid of the phosphate, and if the " mixture be submitted to fusion for four or five hours there " will be obtained phosphuret of iron and scoria or dross." " In " the nodules of fossil phosphate of lime there are, in addition to " the phosphates, silica and oxide of iron; generally the latter is " not in sufficient quantity and it is necessary to add more." The quantity of the phosphorus is ascertained by analysis and a quantity of iron representing 3½ times the weight of the phosphorus is employed.

The operation is easily performed in an iron blast furnace the materials are put in in alternate layers of fuel, nodules, either whole or roughly crushed, and iron. " The iron may be replaced " by cast iron or an oxide of iron, account being taken of the " oxygen of the latter." " The phosphuret of iron thus obtained " is run into ingots, but generally it will be found advantageous " to terminate all the operations at once. The phosphuret of " iron in fusion on its exit from the blast furnace is brought " directly upon sulphate of soda, previously heated " to redness; or the phosphuret of iron and sulphate of soda ground and mixed and heated in a reverberatory furnace are decomposed. The mass is lixiviated " to remove all the alkaline phosphate which " may be afterwards crystallized. The residue is composed of " sulphuret and oxide of iron. The sulphuret of iron may be " utilized by leaving it in heaps exposed to the air, and sprinkling " them occasionally with water. It is thus transformed into " sulphate of iron which may be lixiviated and crystallized." The oxide remaining " may be used in a fresh production of " phosphuret of iron." " Instead of obtaining phosphate of soda

" by crystallization " the phosphoric acid may be precipitated by milk of lime, the phosphate of lime is washed and dried, and the soda obtained by evaporating the liquid, or "this alkali may be " saturated with carbonic acid, and then concentrated to produce " crystals of soda or salts of soda." "The sulphate of soda may " be replaced by the following salts:—Sulphate of potassa, bi- " sulphate of soda or potassa, azotate of soda or of potassa." " All natural and artificial phosphates with a base of lime or iron " may be treated in manner before described."

"Among other applications, the phosphuret of iron may be " used for the production of phosphorus; for this purpose it is " sufficient to submit it to quick redness under the action of " sulphur, sulphuretted hydrogen, sulphuret of carbon, or sul- " phurets yielding a part of their sulphur, such as metallic " bisulphurets and alkaline polysulphurets."

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 21.—N° 2313.

BAGGS, ISHAM, and SIMPSON, WILLIAM.—(*Provisional protection only.*)—" Improvements in the manufacture of chlorine." These are, hydrochloric acid is generated and caused to come in contact with nitric acid. " It is preferred to effect this contact in " a separate vessel. A gentle heat should be applied and chloro- " nitric and chloronitrous gas with free chlorine are given off. " These gases are passed through a series of Woolff's bottles, " gas washing towers, or other analogous contrivance containing " oil of vitriol." Chlorine is evolved and is passed into a close chest containing lime or into a vessel containing lime and water for making chloride of lime, dry, or otherwise, or "into an ap- " propriate vessel or receptacle for effecting other changes." " The deutoxide of nitrogen arrested by the vitriol in the above " operation " is liberated from it by dilution with water and agitation, and is "re-converted into nitric acid by bringing it into " full and complete contact with atmospheric air," by passing the gases up a tower or towers filled with flints, a stream of water running down it or them. "The vitriol is subsequently con- " centrated by evaporation and used again and again." For the above purposes " hydrochloric obtained from any source " is used; but especially employing " the chlorides of the metals, and also of " ammonia, obtained by mixing or dissolving their sulphates with

" common salt or other chlorides of the more positive bases," separating the salts so formed by boiling and crystallization, and, in some cases sublimation. The resulting chloride is distilled with sulphuric acid for muriatic acid, and the sulphate formed re-converted as above to a chloride. "The sulphate of soda," &c. "obtained as above may be applied to the manufacture of " alkali or any other useful purpose."

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 21.—N° 2316.

SCOTT, GEORGE, junior, and **TUDOR**, JAMES.—" Improvements connected wlth the manufacture of salt cake." These are said to be, first, " utilizing the waste heat in salt cake roasting " furnaces, by employing it to generate and superheat or either " generate or superheat steam to be used in or in connection with " the manufacture of salt cake," by means described under the third head.

Second, " employing superheated steam as the vehicle for conveying heat to the vessel or apparatus, and through them to the " salt and sulphuric acid to be decomposed or rendered into salt " cake or sulphate of soda," by means described under the third head.

Third, apparatus constructed with an outer and inner casing, and a space between the two for superheated steam introduced into the same by means of coils or series of pipes leading from a boiler, and continued in a winding form through the flue space of a salt cake roasting furnace, by which means the steam is superheated; there is a pyrometer attached to the apparatus to ascertain the temperature of the steam between the vessels; a pipe conveys away any condensed water; the pan containing the materials is covered, and a pipe leading from it " conveys away the muriatic " acid evolved, and this acid may either be collected or allowed to " pass off into the air." There is a rose for distributing sulphuric acid over the common salt placed in the decomposing pan or vessel, to be made into " sulphate of soda, better known as salt " cake."

[Printed, 8*d*. Drawing.]

A.D. 1864, September 30.—N° 2407.

CROLL, ALEXANDER ANGUS.—" Improvements in the treatment of sulphate of alumina." These are, " combining caustic " *lime or carbonate of* lime with sulphate of alumina, for the pur-

" pose of neutralizing free acid resulting from its manufacture ;" for this purpose, "whilst the sulphate of alumina is in a heated " state, or before it has been allowed to cool down to about 200 F., " or much below that temperature," carbonate of lime in a state " of fine powder, such as ground whiting, is added, and in the " proportion of about 3 per cent.," when it "has arrived at a " sufficiently concentrated state to be capable of forming a cake, " or becoming stiff or solid when cool." These proportions will, however, be dependant upon the condition of neutrality desired to be obtained, or the amount of uncombined acid required to be neutralized.

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 30.—N° 2413.

JOHNSON, John.—(*Provisional protection only.*)—" Improve" ments in decomposing common salt with sulphuric acid in the " manufacture of soda and muriatic acid." These are, in place of decomposing common salt with sulphuric acid in "iron vessels or " pans, which are heated by means of a fire beneath them," the vessels or pans in which the salt is decomposed are heated by means of superheated steam in a surrounding jacket or case. " The vessel or pan is covered with an iron top or with a brick " arch, from which a pipe passes to a flue that leads to a tower " and condensing apparatus, such as is ordinarily employed for " condensing the acid fumes."

[Printed, 4*d*. No Drawings.]

A.D. 1864, October 6.—N° 2460.

MARGULIES, Benedict, and LEATHER, John Knowles. —" Improvements in the manufacture of chromates and bi" chromates." These are, "preparing the charge and submitting " it to the action of the heat of the decomposing furnace in a " compact mass" (hitherto it has been spread out) as follows:— In preference, "equal parts by weight of hydrate of lime and sul" phate of potash and chrome ore reduced to a finely divided " state," are well mixed and brought to the consistency of clay with water and kneading and moulded into blocks "in the shape " of the frustrum of a cone, measuring about eighteen inches " high, eight inches in diameter at top, and nine inches at the " base." The blocks thus formed are exposed, whether in a dry or a moist state, in preference, on the hearth of a reverberatory furnace "to a heat gradually increasing from a low heat to a full "red heat, or even to a white heat," but so as not to flux them. When the blocks are wholly or partially decomposed, they are raked out and placed in a convenient vessel, and "the soluble "compounds of chromium are dissolved out, either by the action "of water or a solution of one or more of the salts of soda or "or potash. The liquor which contains the chrome is then to be "treated by any of the usual methods for the manufacture of "chromates and bichromates therefrom." If the residue after lixiviation contains any undecomposed chromium or its oxide, it is to be formed again into blocks, alone or with other materials as before, and exposed to heat as before. This process "is also "applicable to the production of chromates and bichromates from "any undecomposed chrome ore, or oxide of the same residuary "matter after lixiviation of the charges operated on in the furnace "by the ordinary method."

[Printed, 4*d*. No Drawings.]

A.D. 1864, October 7.—Nº 2468.

PARKINS, Thomas.—(*Provisional protection only.*)—"Improvements in apparatus used in the manufacture of prussiates "of potash." These are, first, utilizing "in the manufacture of "prussiates of potash of woollen matters which have hitherto been "used as manure and considered refuse, and known by a variety "of terms, such as greasy waste, flocks, shoddy, mungo, croppings."

Second. Preventing "the offensive odours emitted by the use "of the ordinary apparatus used in manufacturing prussiates of "potash."

To effect these objects, on the top of an ordinary retort is placed "a box or chamber communicating with the retort and having a "closed top, which is provided with a socket to receive the "ordinary stirrer shaft." On the side of the chamber is an outlet flue connected with the main flue of a series of retorts, so as to carry off the gases evolved and prevent them entering the workshop in which the retorts are placed. It is stated that "this "arrangement of apparatus may be used for the dry woollen "matters which are ordinarily used, as well as for the greasy "matters which it has hitherto been impossible to use in consequence of the offensive odours emitted."

[Printed, 4d. No Drawings.]

A.D. 1864, October 13.—N° 2522.

MORIDE, Edouard.—" Improvements in the treatment of sea " wrack grass for the extraction of the carbon and the salts con- " tained therein." These are, first, " burning, incinerating, and " reducing seaweed into charcoal on the spot, and at a low tem- " perature, by means of apparatus described (a cone-shaped frame " with cast-iron grate at the bottom) or otherwise whilst heretofore " to obtain the same products it has been usual to incinerate the " same, completely burning the very charcoal" formed in this operation, " and treating only incinerated material in order to " obtain the before-mentioned products;" also, " for burning " seaweed on the spot, either in the wet or dry state, even on their " issuing from the sea, in any season, in winter as well as in " summer." The wet seaweed is placed on the outer frame of the cone, and as the dried seaweed is placed on the grate in the interior, little by little, " the flame extends and ascends, drying " the wet seaweed, which becomes carbonized and drops beneath " the grate," when it is raked out and extinguished " either in a " close or other vessel or by watering it slightly."

Second. " Treating the charcoal by cold or hot water, in order " to extract the salts contained therein."

Third. "Applying the carbonaceous residues of seaweed, and " the same, with the addition of terreous phosphates and animal " matters, to agricultural purposes, to painting, to disinfecting " putrid substances, in short, to all purposes where it may be " desirable to use very fine porous and black charcoal."

Fourth. " Extracting iodine and the salts contained in the " mother waters by means of benzine, alcohol, aniline, sulphuret " of carbon, and other liquid carbonated hydrogens." It is stated that the incinerated material is put " into baskets lined " with cloth, and placed in vessels filled with water, where the " salts are dissolved, and on account of their density fall to the " bottom of the vessels. They are then cleared out and evapo- " rated in iron boilers, as practised in salt refineries, where the " salts are collected as they settle, drained, and ranged by cate- " gories, according as they are crystallized at such or such tem- " perature." The mother waters are treated by the ordinary methods, viz., sulphuric acid, chlorine, the salts of copper, and sulphurous acid for iodine, or by the two following processes, which are claimed; first process, " acidify the mother waters by " means of sulphuric or nitric acid," adding a " sufficient quan-

" tity of hypoazotic acid, for setting the iodine free, and dissolve " out that body by means of benzine;" to this liquid add a weak solution of caustic potash, and agitate and decant off the benzine, and evaporate the solution of iodide of potassium, and " calcine the residue and purify it." Second process, evaporate the mother waters to dryness, and treat the residues by boiling alcohol, bleach the solution by animal charcoal, distil off the alcohol used, and "purify the iodide of potassium settled at the " bottom of the still by the known processes."

Fifth. " Manufacturing caustic soda and potash and their car- " bonates with seaweed charcoal by Leblanc's method," by making " a mixture of sulphuric acid, seaweed, charcoal, and lime, like to " that advised by Leblanc," calcining "the whole in a furnace, " ad hoc, lixiviate, and evaporate by the usual methods."

[Printed, 1*s*. Drawings.]

A.D. 1864, October 13.—N° 2526.

BROOMAN, Richard Archibald.—(*A communication from Arthur Baudesson and Paul Houzeau.*)—" Improvements in the " manufacture of prussiates of ammonia, and the application of " prussiates of ammonia to dyeing, printing, and to photography." These improvements in reference to this subject are, in making ferricyanide of ammonium or red prussiate of ammonia by dissolving " 200 pounds of red prussiate of potash with 80 pounds " 7 ounces of sulphate of ammonia," and evaporating "the sul- " phate of potash crystallizing first, the mother waters retain the " prussiates of ammonia, which crystallize afterwards." "To " obtain yellow prussiate of ammonia (ferrocyanide of ammo- " nium)" treating "200 pounds of yellow prussiate of potash " with 124 pounds of sulphate of ammonia" in the same manner.

[Printed, 4*d*. No Drawings.]

A.D. 1864, October 21.—N° 2607.

REYNOLDS, Arthur.—" An improved mode of manufactur- " ing sulphuric acid." This consists "in the employment of a " solution of copper or other metal capable of forming more than " one oxide," which solution is to be brought " into contact with " sulphurous acid and air, or other mixture of gases containing " free oxygen, to cause the formation of sulphuric acid." A weak solution of sulphate of copper is preferred. "The contact

" may be effected by allowing the solution to trickle over pebbles " in a chamber through which the gases pass, the solution being " returned to the top of the chamber, and allowed to trickle down " again, and so on; or a fan may be employed to dash the liquid " into spray, or indeed, any other known means may be adopted " for bringing the liquid intimately into contact with gases. The " solution of metal acts as a carrier between the oxygen of the " air and the sulphurous acid, so that a small quantity of metal " in solution will cause the formation of a large quantity of sul- " phuric acid." " The metal can be removed from the solution " and used again; the separation may be effected by means of " sulphuretted hydrogen, or the sulphate may be allowed to " crystallize out of the concentrated acid."

[Printed, 4*d*. No Drawings.]

A.D. 1864, October 24.—N° 2634.

CLARK, WILLIAM.—(*A communication from Eugène Alphonse Cotelle.*)—" Improvements in apparatus for concentrating and dis- " tilling sulphuric and other acids, and all solutions in general." These relate to improvements in apparatus for similar purposes, described in No. 454, 1864, and consist in dispensing " with the " retort, therein described as containing the pumice-stone serving " for the concentration of the acid or other solutions," and placing the pumice-stone simply " in the furnace, the sides of " which are slightly more inclined than usual; the products of " combustion thus heat the pumice-stone direct, and so permit of " economizing and utilizing the whole of the heat of the furnace." " In certain cases with this arrangement, the products of com- " bustion might act injuriously on certain saline or acid solutions, " to obviate which, as much as possible," a second furnace is placed " at a certain distance from the first mentioned, and " separated from it by a channel filled with pumice-stone, which " arrangement permits of the flame being purified, while an open- " ing is left in this channel for the introduction of the air for " consuming the organic matters, which may be carried away by " the flame when treating saline solutions or acids that are liable " to change." The furnace is heated " with hot air by means of " tubes containing pumice-stone or other matters, which are raised " to a high temperature by the aid of a special furnace."

[Printed, 8*d*. Drawings.]

A.D. 1864, November 16.—N° 2864.

NEWTON, William Edward.—(*A communication from Anel Bang.*)—(*Provisional protection only.*)—" Improvements in the " manufacture of soda." These are, decomposing " oxalate of " ammonia and hydrochlorate of soda, or common salt," as follows, to a hot concentrated solution, containing " about 600 lbs. " of oxalate of ammonia is added, about 5 cwt. of hydrochlorate " of soda or common salt," and steam admitted. On allowing the whole to cool with stirring, nearly all the oxalate of soda will be precipitated, and the liquid " consists of a tolerably concen- " trated solution of hydrochlorate of ammonia or sal ammoniac, " and a small portion of dissolved oxalate of soda." This liquid is decanted, and the oxalate of soda " thoroughly washed with a " cold concentrated solution of oxalate of soda." This oxalate of soda is next " well mixed with 280 lbs. unslaked lime, in the " form of thin milk of lime, steam being admitted thereto, " whereby it will be converted into caustic soda and oxalate of " lime." The solution of caustic soda is decanted off, " and con- " verted into dry caustic soda or carbonate, the latter by the " introduction of the gas of combustion until neutralized." The washings of the oxalate of lime are used for slaking the lime, used as above. The oxalic acid as oxalate in the solution of sal ammoniac, is precipitated from it by a solution of chloride of calcium. The oxalate of lime is " well stirred with cold water, " and ammonia, and carbonic acid simultaneously introduced, " keeping the mixture well stirred, whereby in the hot solution it " will be completely changed into oxalate of ammonia and car- " bonate of lime." " The ammonia will be obtained from the " liquid hydrochlorate of ammonia, through heating with milk of " lime, and the carbonic acid from the gases " in burning coke.

[Printed, 4*d*. No Drawings.]

A.D. 1864, November 17.—N° 2876.

HUNTER, Andrew George.—" Improvements in the manu- " facture of soda and potash." These are, decomposing solutions of sulphate of soda and sulphate of potash with a solution of caustic baryta. " The proportions of the chemical ingredients " mentioned vary according to their chemical equivalents, which " are well known to practical chemists." The sulphate of barytes is separated " from the liquor by means " of filtration or subsidence and decantation, and after washing it, it is employed to " similar " *purposes to those* for which native sulphate of barytes is used."

The caustic soda or potash may be carbonated by "injection of or "exposure to carbonic acid," and converted into carbonates or bicarbonates of soda or of potash.

[Printed, 4*d*. No Drawings.]

A.D. 1864, November 25.—Nº 2948.

LEISLER, Louis.—"Improvements in obtaining bromine and "bromides, and in apparatus therefor." These are, obtaining bromine and bromides, from all substances containing bromine, "whether in large or small proportion, but peculiarly suitable for "the treatment of what is known as 'German chloride of mag-"nesium,' of the residuary liquors from sea water, and of kelp "liquors," by liberating the bromine from the substance by the action of bichromate of potash, and an acid aided by heat; the bromine is passed through a condenser containing wrought-iron turnings, with which it forms bromide of iron, which "may be "converted in the usual manner into bromide of potassium, or "into other bromides." In preference, the bottom of the still is iron, whilst the head is of lead, dome-shaped and large. The exit pipe of stoneware or lead communicates with a stoneware receiver, having a tap to draw off any liquid. A saturated cold solution of bichromate of potash is added to the liquor heating in the still, "until there are about two pounds of the bichromate "of potash to every hundred gallons of the liquor, and the same "is thoroughly mixed with the liquor. Before the liquor reaches "a temperature of 150° F., there is added to it one gallon of "hydrochloric acid (previously diluted with three or four times "its bulk of water)." The head is now put on and the whole connected. The liquor is kept gently and steadily boiling. "To "facilitate the primary evolution of bromine fragments of flint, "or the like, may be placed in the still, or air, or steam may be "blown through the liquor to carry the vapours more readily to "the condenser." Granulated zinc may be substituted for the iron turnings, and sulphuric or nitric acid for the hydrochloric acid before mentioned.

[Printed, 4*d*. No Drawings.]

A.D. 1864, December 1.—Nº 2998.

BINKS, Christopher.—(*Provisional protection only.*)—"Im-"provements in separating sulphur from coal and coke." These are, first, reducing "the impure coal to a fine powder," and mixing this powder with water, or, in preference, "levigate the "impure coal in water and then pass atmospheric air, either of "ordinary temperatures or artificially heated, into and through "this mixture, in order thoroughly to agitate the mixture and "suspend in or diffuse the mixed particles of coal and pyrites "through the water." The agitation is now stopped, and the whole allowed to rest until the pyrites, by reason of its superior gravity, has settled in the bottom of the apparatus, from whence it is carried off, and this is repeated as often as is necessary, until the pyrites is all or nearly all removed. Other appliances besides air may be employed for agitating the mixture of pulverized impure coal and water.

Second, exposing moist pulverized impure coal to the prolonged action of air, heated air preferred, or air mixed with ordinary steam or superheated steam, so as to convert "the insoluble bi-"sulphuret of iron into soluble sulphate of iron and free sul-"phuric acid," removable by washing. "Any unoxidised portion "of pyrites can be removed by the mechanical action of subsi-"dence, as described above."

Third, exposing the moistened impure pulverized coal in heaps or beds to air or heated air, or heated air and steam, and washing out the products, which it is said are "valuable products, but can "be further utilized in the manufacture of other products."

Fourth, to coke made from impure coal, adding "water acidu-"lated with some kind of acid capable of forming with the "protosulphuret of iron left in the coke a soluble salt of iron," and liberating sulphuretted hydrogen. The residual salt of iron is removed or not, as desired.

[Printed, 4*d*. No Drawings.]

A.D. 1864, December 14.—N° 3102.

PRICE, Astley Paston. — (*Provisional protection only.*) — "Improvements in obtaining carbonic acid gas." These are, carbonic acid from the combustion of coal, coke, charcoal, or other carbonaceous materials, or from the combustion of hydrocarbons, carburetted hydrogens, or carbonic oxide, or in calcining chalk, dolomite, or other carbonates, is absorbed into water by bringing it into contact with the water, "either in a manner "similar to that which is now employed for the purification of "coal gas in what are known as scrubbers, or by the employment "of suitable suction and forcing pumps or fans." "The expul-"sion of the carbonic acid gas from its solution in water may be

" effected by placing the solution in a vessel capable of being " closed and provided with inlet and exit pipes, and so arranged " that the contents may, if required, be subjected to the action of " a vacuum, and that heat may be applied either by direct appli- " cation to the exterior, or by the introduction or circulation of " hot air, hot water, or steam in the interior," or "in any well- " known manner." The collection and transmission of the gas expelled from its solution in water "may be effected by the em- " ployment of conducting pipes and exhault (exhaust [?) and " forcing pumps or fans."

[Printed, 4*d*. No Drawings.]

A.D. 1864, December 24.—N° 3203.

MARGULIES, Benedict, and LEATHER, John Knowles. —(*Provisional protection only.*)—" Improvements in the manu- " facture of chromates and bichromates." These are, a mixture " of lime, or hydrate of lime, or other alkaline earths and chrome " ore or oxide of chromium (or of one or more of the impure com- " pounds of chromium), with or without one or more of the salts of " soda or potash, and with or without manganese or other oxygen " bearing material, and with or without silica." In preference equal parts by weight of hydrate of lime and sulphate of potash and chrome ore are mixed together, and with water brought to the consistence of clay and moulded into conical blocks which are exposed on the hearth of a reverberatory furnace, and subjected to a heat, gradually increasing from a low heat to a full red heat, or even to a white heat, avoiding fluxing the blocks. The blocks are raked out of the furnace, and "the soluble compounds of " chromium are dissolved out, either with water or with a solu- " tion of one or more of the salts of soda or potash, and the " liquor is treated by any of the usual methods for the manufac- " ture of chromates and bichromates." Any undecomposed chromium, either in the same state or after the addition of one or more of the materials aforesaid, are made into blocks, which are exposed to heat as before and lixiviated as before. This process is applicable to "undecomposed chrome ore, oxide of chromium, " or impure salts of chronium," which may remain "after lixivia- " tion of the chrome charges operated on in the furnace by the " ordinary method."

[Printed, 4*d*. No Drawings.]

1865.

A.D. 1865, January 2.—N° 3.

LEVERSON, Montague Richard.—(*A communication from John Oliver.*)—In the Provisional Specification this is stated to be "An improved method of treating apatite and other mineral "phosphates," while in the Final Specification it is stated to be "Improvements in the mode of treating certain mineral "phosphates and obtaining products applicable to agricultural "and manufacturing operations." This consists in the separation of impurities from "highly impure ores containing phosphates" by crushing or grinding and removing from "the crystallized "phosphates" the impurities "by means of hand picking, "washing, and jigging." "The phosphates may then be more "readily acted on by the proper acid." The acids preferred are "sulphuric, hydrochloric, or nitric acids." If sulphuric acid is employed, in preference "using about 98 lbs. of oil of vitriol "($SO_3 + HO$), diluted" "to 156 lbs. of tribasic phosphate of "lime." The sulphate of lime "is precipitated," and "the solution of biphosphate of lime" is drawn off and employed in "the manufacture of phosphorus, phoshoric acid, or other "phosphatic compounds." If hydrochloric acid is employed, in preference "using 72 lbs. ($H\,Cl$);" or if nitric acid is used 108 lbs. "(NO^5)" both diluted, to 156 lbs. of tribasic phosphate of lime, or a mixture of these acids may be used. The phosphates are dissolved, leaving the impurities. In every case it may be found convenient to vary the proportions of acid and the dilution of the same.

[Printed, *4d.* No Drawings.]

A.D. 1865, January 2.—N° 5.

PARKER, John Frederick, and TANNER, Joseph.—"Improvements in the manufacture of oxygen gas, and in treating "and economizing the residual products of the said manufacture." These are, first, "manufacturing oxygen gas by heating a mixture of nitrate of soda and quicklime."

Second. "Treating and economizing the residual products of "the said manufacture of oxygen gas," "that is to say, obtaining from the said products caustic soda and a compost consisting of lime and nitrite of lime," as follows:—"Protoxide of "calcium or quicklime" is heated to redness with stirring, and mixed with half its weight of nitrate of soda and distilled in a retort at a bright red heat, and the oxygen gas evolved passed through water to deprive it of any nitrous acid, or the gas may be passed through a tube, cylinder, or other vessel heated to bright redness, and the gas is passed into a condenser. The residue is mixed with half its weight of nitrate of soda and distilled as before, and the gas collected. The residuum is boiled with water, and the clear solution evaporated, caustic soda is obtained in the solid state, the undissolved portion is mainly lime, which is mixed with the nitrous acid obtained by purifying the oxygen, and thus a compost is obtained useful as a fertilizer. The nitrate of soda and lime may be mixed in equal proportions, and after heating as above, the residuum may be at once taken for the caustic soda or compost; or the residuum in either case may be used by glass and soap makers. The proportions of quicklime and nitrate of soda may be varied.

[Printed, 4*d*. No Drawings.]

A.D. 1865, January 10.—N° 80.

CLARK, **William**.—(*A communication from Zéphirin Gaspard Alexandre Nathan Pétrone Orioli, Amable Alfred Fredet, and Pierre Amable Henri Matussière.*)—"Improvements in preparing "or treating wood and other vegetable fibrous materials for the "manufacture of pulp for paper." These are, in reference to this subject, as follows:—In applying "aqua regia for the purpose of "destroying, dissolving, and effecting the disentegration of all the "gummy portions of ligneous matters without injuring the "cellular tissue. The coloring matters are also at the same time "transformed into pieric (picric?) acid and chlorated composites, "which are easily eliminated by washing, steeping, and the use "of chlorine." "The aqua regia is composed of from five to "forty per cent. of nitric acid, and from sixty to ninety-five per "cent. of hydrochloric acid," according to "the nature of the "colored and gummy elements contained in the vegetable fibre."

[Printed, 4*d*. No Drawings.]

A.D. 1865, January 28.—N° 249.

BURQ, **Victor**.—"Improvements in filtering apparatus." These are, first, "filiteration in the cold or in the heated state on a large "or on a small scale of water, wine, beer, vinegar," &c. &c. "by "means of thin blades, plates, slabs, diaphragms, or other similar "mediums constructed of either natural or artificial suitable "porous stone or suitable porous filtering compounds," properly cemented and fixed to resist the pressure of the liquid to be filtered, and allowing the filtration to take place from either side or surface of them. Cleansing the filter by "causing filteration "to take place for some time in an opposite direction," which cleanses the filter; cleansing brushes may also be employed, and "the current of the water in which the apparatus" is immersed is taken advantage of for cleansing their surfaces.

For manufacturing the diaphragms, using "porcelain or other "suitable clay or ceramic mass," into which is mixed "wood-dust "powdered wood, or animal charcoal, peat, or other suitable "minutely divided combustible matters, the quantity and nature "of which depends on the degree of porosity to be given to the "said artificial porous slabs," &c., after which they are baked or fired. When these slabs are required, "not only as a filtering "but also as a disinfecting medium," "they may be formed of "suitable carbonaceous matters, such, for instance, as finely-"pulverized bitummous coal, coke, breeze, wood, or animal char-"coal, to be thoroughly mixed with tar, clay, or other suitable "agglomerating material," and moulded, and baked in air-tight vessels.

Second. Filtering large bodies of water by the above means.

Third. The general arrangement of apparatus, and "if required "the apparatus to be kept floating or immersed in the upper or "purer portions of the liquid to be filtered."

Fourth. The apparatus for filtering, &c. "paper pulp, ceramic "slips or paps, or others of a similar nature."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1865, January 30.—Nº 263.

LAURENT, François Alexandre, and **CASTHELAZ** John.—"Improvements in the manufacture of benzoic acid." These are, making "benzoic acid by decomposing a salt of phtalic acid "by means of heat acting in conjunction with a suitable base," as follows:—Phtalic acid is produced "by processes which are well "known, either by the oxidation of napthaline, by means of "bichromate of potash, permanganate of potash, or oxide of "lead, or it may be by the oxidation of bichloride of naphthaline

" with nitric acid." The phtalic acid is combined "with lime, so " as to produce a neutral phtalate of lime," and one equivalent of this salt is mixed with one equivalent of hydrate of lime, and this mixture is heated "to a temperature of from 330° to 350° " centigrade, (say 626° to 662° Fahrenheit); this heat is maintained for some hours," the time varying with the temperature employed and quantity of material. The heat is regulated by means of a pyrometer. The mixture after heating the required time in preference is extracted by " water with free steam blown " into it, and in this way it is boiled for several hours." And this is repeated two or three times; the liquids containing benzoate of lime are "treated with hydrochloric acid, which precipitates the " benzoic acid. When the liquid is cold it is filtered, and the " benzoic acid collected, washed with a small quantity of water, " and dried."

[Printed, 4*d*. No Drawings.]

A.D. 1865, February 2.—N° 297.

ROUTLEDGE, Thomas.—" Improvements in treating spent " or used leys resulting from the preparation of fibrous substances used in the manufacture of paper stock." These are, " the spent leys from the boiling pans" are conveyed by gravitation, if possible, into a suitable vessel or vessels " placed over or in " connection with some flue or where spare heat is available," or into a closed boiler or other vessel either revolving or stationary, or the liquor agitated therein, "connected with a furnace, and the " steam from the evaporation" utilized as a source of heat or otherwise. This furnace may also be connected with and furnish the heat for a tower or other suitable arrangement, in which are a number of trays, over which the liquor flows from one to the other, whilst air introduced at the lower portion of the tower is drawn upwards "by means of a chimney [draft, fan, " blast, suction, or other convenient method." Heated air may be drawn from a furnace through the tower. In place of shelves or partitions the tower may "be furnished with layers or strata of " broken stone, flints, pottery, coke, or other suitable material," through which the leys descend in showers. The spent leys collected at the bottom are again heated, and passed through the *tower*, " until the liquor is sufficiently concentrated, or the liquor " may be cooled down, and any crystallizable salts fished out; the " liquor may finally be run into a reverberatory or boiling-down

" furnace," and evaporated and ignited, and the ash lixiviated in the ordinary manner, and the alkaline salts rendered caustic by lime, and then clearly drawn off. In rendering carbonate of soda or soda ash caustic, lime is used, which gives a precipitate of carbonate of lime containing a considerable per-centage of alkali; this alkali it is proposed to regain by carefully washing or filtering the precipitate, and adding the liquor to the water used for making fresh leys; forming bricks of the carbonate of lime, rendering it caustic by burning, and using it in making fresh leys.

[Printed, 6*d*. No Drawings.]

A.D. 1865, February 4.—N° 307.

ROW, Frederic.—" Improvements in the manufacture of citric " and tartaric acids, and in the manufacture and treatment of " citrate and tartrate of lime, and analogous basic compounds, " and in apparatus employed therefor." These are, first, " the " separation of the coloring matter from the concentrated lemon " juice by dilution with water," as much being added as may be " necessary to precipitate as much as possible of the colouring " matter."

Second. " The removal of the iron held in solution in lemon " juice and solutions of tartar by means of ferrocyanide of potassium;" the " proportions usually required for the treatment of " one pipe of lemon juice as imported being about three parts of " water and four pounds of ferrocyanide of potassium." After standing, the clear liquid is drawn off into what is called the generator.

Third. " The construction, combination, and arrangement of " the apparatus for washing citrate and tartrate of lime or other " base." This consists of " a wooden cistern lined with lead," called " the decomposing back," " the bottom of which is slightly " rounded, so as to facilitate the action of the stirrers," which consist of splints of wood " fixed into a square spindle occupying " one-third more or less of the whole length," " the spindle, when " in action, being turned by a band on a pulley at the end of it, " and actuated by any suitable motive power." There " is a false " bottom made of wood covered with flannel or any other filtering material, or the patent silicious stone may be used." There is an outlet for the filtered liquor, also an outlet pipe for the air contained in the chamber, and a lead pump outside at the end to produce "a partial vacuum when necessary," as also a cover.

[Printed, 8*d*. Drawing.]

A.D. 1865, February 4.—N° 310.

PHILLIPS, John Arthur.—"Improvements in the purifica-"tion of lead to be employed for the manufacture of white lead, "red lead, and litharge." These are, first, "the purification of "desilverized lead, or lead which does not contain an available "amount of silver, by adding thereto zinc, and removing the "scum or dross rising to the surface of the bath." The proportion of zinc which it is preferred to employ "varies from ½ per "cent. to 1 per cent."

Second. "The removal of the last traces of zinc from lead so "prepared, by subjecting it to a high temperature in a furnace, "in the bottom of which it forms a bath, covered by small coal "or other carbonaceous matter." The zinc "is volatilized." "The lead contained in the scum taken from the surface of the "pot or furnace," is "recovered by eliquation, either in a pot or "furnace."

[Printed, 4*d*. No Drawings.]

A.D. 1865, February 16.—N° 449.

LAURENT, François Alexandre, CASTHELAZ, John, and BASSET, Nicolas.—(*Letters Patent void for want of Final Specification.*)—"Improvements in the manufacture of oxalic "acid." These are, making this acid from waste animal matter, in preference "the cuttings of leather or hides, woollen rags, wool "or hair, the pairings or refuse of horn, residuum of glue "the waste pieces of tanneries, and other waste animal matter of "this description." By preference these matters are dissolved or disintegrated "by sulphuric acid diluted to about 20 per "cent.," and the product treated "with nitric acid of a density "of, say, 36° Beaumé, diluted with three or four times its weight "of water at a temperature of about 176° Fahrenheit." The quantity of nitric acid employed is not generally "greater than "the weight of the material to be treated." The materials may "only be treated with dilute nitric acid, but by previously treat-"ing the matters with sulphuric acid, a much smaller quantity of "nitric acid is necessary." Also obtaining "oxalic acid from

" molasses, sugar, and analogous hydrocarbon bodies (which are " the materials from which oxalic acid is usually obtained) by the " successive action of sulphuric and nitric acids."

[Printed, 4*d*. No Drawings.]

A.D. 1865, February 17.—N° 456.

CHRISTIAN, John Osborne, **CHARLTON,** John, and **CHARLTON,** Henry.—" Certain improvements in the manu- " facture of magnesium and its compounds." These are, first, " in the application and use of carbonate of magnesia or 'dolo- " 'mite,' (or a carbonate of magnesia or 'magnesite,' combined " with any other carbonate), instead of carbonate of lime or other " carbonates, in the generation of carbonic acid gas, such as, for " instance, in the aerating of waters," &c.

Second. " In the application and use of magnesia or magnesian " compounds instead of lime in the process of distilling tar water, " and in the manufacture of ammonia or its salts from any of the " salts of ammonia, leaving valuable magnesian compounds as " residue."

Third. " Manufacturing sulphate of magnesia or other valuable " magnesian residue by passing sulphuretted hydrogen through " 'dolomite' or calcined 'dolomite,' or other magnesian com- " pounds, either in a wet or dry state, which will leave a residue " valuable for the manufacture of sulphate or other compounds " of magnesia."

[Printed, 4*d*. No Drawings.]

A.D. 1865, February 17.—N° 460.

CLAUS, Charles Frederick.—(*Provisional protection only.*)— " Improvements in obtaining sulphates and carbonates of potash " and soda." These are, employing " the rock salt of Strassfurt, in " Prussia, or similar rock salt containing a large per-centage of " chloride of potassium, or it may be the refined salt in which " the chloride of potassium has been increased by crystallization." In the case of the native rock salt it is ground, otherwise, it is not, and decomposed with its equivalent of sulphuric acid in the same way as it is done with common salt, and the mixed sulphates are ground and treated " repeatedly with water, by preference at a " temperature of about 90° to 100° Fahrenheit ;" any sulphate of potash in solution is crystalized out of the sulphate of soda.

The solution of sulphate of soda is evaporated to dryness, and (if required) the sulphate is converted "into carbonate by the " process generally known, and which is no part" of this invention. " The sulphate of potash when freed from all salts of soda " by repeated washings with water," if required, is converted into carbonate by "a process analogous to the well-known alkali " process (Leblanc's), " and the carbonate lixiviated and refined.

[Printed, 4*d*. No Drawings.]

A.D. 1865, February 18.—N° 469.

GRAHAM, James.—"Improvements in treating products obtained " when coating iron with zinc." These are, in reference to this subject, as follows, " chloride of flux skimmings or dross removed " from the surface of the melted zinc," are "first crushed by " edge runners or otherwise," and placed in a vessel with a false bottom, in preference of wicker-work, and allowed to stand in water for a day or two; the water is run off from a tap under the false bottom, and the residue is treated again in the same way, when free steam is blown in "under the false bottom so as to " cause the water to boil, and in this manner the remaining " soluble parts of the flux, dross, or skimmings, are dissolved." " The three decoctions thus obtained are mixed in a suitable vat," and the zinc precipitated as oxide, by preference, with soda ash in a covered vessel to prevent the escape of ammoniacal fumes. The liquor drawn off is distilled from a close vessel into "a receiver " containing water acidulated with muriatic acid; the pipe which " conveys the ammonia from the still terminates at the surface of " the weak acid." When the acid "becomes saturated, or nearly " so, it is drawn off and concentrated by evaporation, and the " muriate of ammonia is crystallized out." "When liquor " ammonia only is desired the solution may be precipitated by " lime; the liquor ammonia is distilled over in vessels suitably " cooled exteriorly."

[Printed, 4*d*. No Drawings.]

A.D. 1865, February 23.—N° 515.

MEYER, Adolph, and MEYER, Moritz.—(*A communication from Wilhelm Gerhardt.*)—(*Provisional protection only.*)—" Improvements in preparing explosive compounds." These are, first, in "preparing a fulminating salt," dissolving one part of quicksilver in 10 parts of concentrated nitric acid, boiling the same and adding "12 parts alcohol (95 to 100 degrees), the heat " is continued until vapours rise from the vessel." After a little while the vessel containing the solution is cooled down in a vessel of cold water, and a precipitate takes place, which is washed, collected on filtering paper, and when dry is ready to be used as follows :—

Second, taking "20 parts of fine powder, 1 part of antimony, " and 2 parts of refined salt petre in powder," and mixing them well together.

Third, taking "5 parts of the fulminating salt, 1 part of the " powder mixture and ½ a part of Roman cement; these parts are " to be well mixed," adding "a small quantity of dissolved gum, " just enough to make a paste." "This must when dry be made " waterproof by means of grease dissolved and applied with a fine " brush."

The above proportions may be altered.

[Printed, 4*d*. No Drawings.]

A.D. 1865, February 25.—N° 532.

ROUTLEDGE, THOMAS, and RICHARDSON, THOMAS.— " Improvements in the treatment and utilization of certain " products obtained in the manufacture of paper or of paper " stock." These are, first, "lixiviating the black balls obtained in " the manufacture of alkali by means of the spent leys or waste " liquors resulting from the boiling process of esparto or alfa " grass, straw, or other fibrous substances."

Second, "the employment or use of the liquor obtained by the " process last claimed in the process of boiling esparto, straw, and " other fibrous material."

Third, "obtaining a ley or leys suitable for the treatment of " esparto, straw, and other fibrous materials, by boiling down the " liquors resulting from the process firstly and secondly claimed," and "afterwards destroying the organic matter therein by means " of a red heat, and finally lixiviating the residuum."

Fourth, "the obtaining of a substance which after lixiviation " is suitable for leys for the treatment of esparto grass, straw, or " other fibrous material by concentrating or evaporating (to a pasty " consistency) the spent leys or waste liquors resulting from the " boiling process above claimed, and mixing the same with sulphate " of soda, and thus submitting the same to calcination."

Fifth, "the obtaining of a ley or leys suitable for the treatment "of esparto grass, straw, or other fibrous material by evaporating "or concentrating to a pasty consistency the spent leys or waste "liquors above claimed and mixing the same with sulphate of "soda, carbonate of lime, and coal, the ordinary materials of the "black ball, and submitting the whole to what is known as the "balling process, and then to lixiviation."

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 2.—N° 580.

HORTON, Thomas, and PRICE, David Simpson.—"Improvements in the treatment of certain products obtained in the "smelting of iron." These are, in reference to this subject, "collecting of the ammoniacal products contained in the gases "emitted from blast furnaces when coal is wholly or partially "used." The waste gases are conveyed "by a wrought-iron "tube communicating with the upper part of the blast furnace;" "water in a fine spray" is injected into the wrought-iron tube, in "preference, near to its junction with the mouth of the furnace." The pipe is likewise surrounded with water, or a stream of water falls upon it. "Where the draught is sufficiently powerful, or "where auxiliary means can be employed for overcoming "pressure, scrubbers or coke columns through which water or "acidified water passes, or other similar contrivances, may be "added to the above described arrangement, with a view to the "more complete absorption of the ammoniacal products con-"tained in the gases above mentioned." The other parts of the Specification refer to the condensing of the oils.

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 3.—N° 596.

BOWDITCH, William Renwick.—"An improvement in carburetting gas, also in the preparation of hydrocarbons for car-"buretting gas, and improved methods of treating alkali which "has been used to purify coal oils, shale oils, petroleum, and "other mineral oils." This consists, in reference to this subject, as follows:—First, the alkali which has been used as above has a current of carbonic acid passed "into it until two layers are "formed;" "one layer consists of oily acids and other substances "removed from the oils, and the other of caustic and carbonated

" alkali in water. These layers are separated by a syphon, or in " any other convenient manner. The oily compounds are employed for steeping timber or other suitable use, and the alkaline solution is evaporated to obtain its salts in the solid state; " or it is treated at once with lime to obtain caustic alkali. The " caustic solution is fit for use in the purification of hydrocarbon " oils."

Second, the impure alkaline solution exposed for some considerable time to the air, "the oily compounds become decomposed, " and the alkali partially carbonated," and the alkali, causticised by lime, is fit for use in the purification of hydrocarbon oils. The oils becoming of a light colour, the alkali is fit to be rendered caustic for use. "Air, or the gases of combustion free from " smoke," are passed "through the alkaline solution hot or cold, " which expedites the destruction of the compounds removed " from the oil, and the purification of the alkali."

[Printed, 8*d.* Drawing.]

A.D. 1865, March 6.—N° 629.

NICHOLSON, THOMAS.—(*Provisional protection only.*)—" An " improved process of and apparatus for making caustic liquor or " caustic lees." This consists in using "a number of vats " arranged in a consecutive series of, say, six vats. The first vat, " No. 1, is charged with the usual ingredients, such as carbonate " of soda and lime; hot water is then run in from a cistern;" steam is admitted to an outer case or jacket, and the whole boiled till it is caustic, and "allowed to settle; a quantity of carbonate " of soda and lime is then put into No. 2 vat. A cock or valve " is adapted to the partition between vats Nos. 1 and 2, so that " by continuing to run on water into No. 1 vat, vat No. 2 will be " supplied with sufficient water for boiling the contents, which is " effected by blowing in steam until the liquor is sufficiently " boiled or made caustic, as in No. 1. The process is continued " until No. 6 vat is filled. When the liquor is considered to be " sufficiently strong, or as strong as practicable, it may be " syphoned off. By this time the liquor will be, say, 40 degrees " strong," but if it is required stronger "the sludge in No. 1 vat " may be dried off" and emptied out, and fresh materials put into the vat, and proceed much as before.

[Printed, 4*d.* No Drawings.]

A.D. 1865, March 15.—N° 729.

PRICE, ASTLEY PASTON.—"Improvements in obtaining sul-" phurous acid." These are, "obtaining sulphurous acid from " mixed gases, and the separation and utilization of the same, by " effecting the absorption or solution of sulphurous acid in water " or in a solution of sulphites, or in water holding in suspension " sulphites capable of absorbing the sulphurous acid gas, and of " disengaging the same when the temperature of the solution is " elevated, or when subjected to the action of a vacuum either at " the ordinary or at elevated temperatures." The mixed gases, if necessary, are conducted, "by means of a fan, or by means of " suction and forcing pumps or other apparatus," into "what is " known as a scrubber, or in a modification of the same, or by " means of a gas-impregnating apparatus." No claim is made to the apparatus employed. In disengaging the sulphurous acid from solutions it is preferred to "apply heat in conjunction with " the employment of a vacuum."

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 18.—N° 765.

STEVENSON, JAMES COCHRAN.—"Improvements in the pre-" paration of hyposulphite of lime." These are, as follows:—In a former patent, N° 330, 1861, a process was given by "which " a solution of hyposulphite of lime was produced from the yellow " liquor obtained by the oxidation of soda waste. The soda waste " was exposed in a thin layer to the action of air and moisture, " and was repeatedly turned over; the yellow liquid is then " obtained from it by lixiviation. This liquid was saturated with " sulphurous acid gas, and so sulphur was precipitated and a " solution of hyposulphite of lime was produced." "The solu-" tion of hyposulphite of lime thus or otherwise obtained," if evaporated by heat in the open air, is decomposed, and it is "now " proposed to evaporate it in a vacuum pan made of iron, similar " in construction to that used in the manufacture of sugar;" the " mercurial barometer in the pan will mark only from half-an-inch " to one inch pressure. The solution is boiled at a temperature " of 110° F. until it reaches the specific gravity of 1·480." If the crystals are not sufficiently pure they "are re-dissolved in a water " bath at a temperature of 110° F., and the quantity of water em-" ployed to dissolve them is such that the solution may be of a

" specific gravity of 1·450, and is then crystallized a second time; " or the salt may be re-dissolved in cold water, and then again " concentrated to the crystallizing strength above mentioned in " the vacuum pan."

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 21.—N° 788.

BROOMAN, **Richard Archibald**.—(*A communication from Charles Kestner.*)—" Improvements in the preparation of hydrated " oxide of chromium." This is said to be an improvement upon a process described in N° 1702, 1858, and consists " in substituting " for the bichromate of potass, or the salts of chromium, ordinary " chromic hydrate, chromic oxide, or chromic acid. With the " ordinary grey hydrate, dried at 212° Fahrenheit, six parts of " boracic acid are used to one part of hydrate. The mixture fuses " on being subjected to red heat, and a chromic borate is obtained; " this is treated with water, which decomposes it with disengagement of heat into boracic acid, which remains in solution, and " into hydrated oxide of chromium or emerald green."

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 22.—N° 797.

POTTER, **Harold**. — " Improvements in treating the waste " liquors obtained in bleaching certain vegetable substances." These are, " recovering the soda from the waste liquor obtained in " bleaching jute and the waste of flax, commonly called 'shove' " or 'shew.'" The waste alkali is evaporated until on cooling it assumes a pasty consistency, or of such a consistency that it may be introduced into a reverberatory furnace and carbonized with stirring until the burning is complete. The mass is removed from the furnace as the gas ceases to be evolved, and allowed to cool; is lixiviated or washed in water, and the solution, carbonate of soda, " is then boiled in a vat by steam, and rendered caustic by the " addition of slaked lime; after this the liquor may be allowed " to settle and cool."

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 28.—N° 872.

WALSH, **William**.—(*Provisional protection only.*)—" Improve- " ments in apparatus employed in the concentration of all solu-

"tions where quick or speedy concentration or evaporation is "required." These relate particularly to the manufacture of caustic and carbonate of soda and potash, chloride of sodium and potassium, or similar alkalies or acid solutions, but it is "appli- "cable to all solutions where a quick or speedy concentration or "evaporation is required." For this purpose "an agitator of any "suitable construction" is placed in the pan or vessel containing the solutions requiring "to be concentrated or evaporated," and a revolving motion is given to the agitator "by placing or fixing "to it a pulley to revolve inside the liquor or solution," over which pulley is a chain extending to a pulley on the line shaft above the pan or vessel, in this way avoiding "the necessity of a "cross shaft and stuffing boxes outside the pan or vessel, which "are very objectionable."

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 28.—N° 877.

YOUNG, Richard, and GLASSFORD, Charles Finlay Oliphant.—"Improvements in the preparation or treatment of "seaweed and in obtaining products therefrom." These are, "the drying or partial drying," in the following manner, "of sea- "weeds by artificial heat, and the slowly burning, incinerating, "or charring of such partially dried seaweed," as follows, "so as "to produce an ash, ashes, or dry powder, which contains all the "most valuable constituents now wasted by excessive heat during "the production of kelp from the seaweed:"—The seaweed collected is allowed to lay in heaps "until it has lost a portion of its "moisture by the pressure of the masses of weed." The liquor is saved, and "afterwards treated for the separation of the saline "matter which it contains. The seaweed is then evenly spread "upon the surface of the drying stoves," and repeatedly turned over until sufficiently dry, but not too much so, as "it only "smoulders and burns slowly." When dried, either as above or "by sun heat and exposure to dry air in summer," the weed is burned by heating strongly on iron plates, fire-tiles, or any hot surface until it takes fire and burns slowly; or it is charred in the interior of a capacious fire-place or oven, or incinerated in the open air, or in wet weather under a shed or outhouse, on a framework of wrought or cast iron. As the weed consumes the ash falls through the bars.

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 30.—N° 900.

CROLL, Alexander Angus.—" Improvements in the manu-" facture of sulphate of alumina." These are, manufacturing sulphate of alumina as follows :—" Five parts by weight of oil of " vitriol, sp. gr. 1·845, diluted with water to the sp. gr. of, say, " 74 Twaddle, and heated to about 220° F., at which temperature " the sp. gr. will show about 65 Twaddle ;" to this diluted acid adding " about 4 parts by weight of thoroughly dry and finely " divided clay, rich in alumina, and which has been previously " roasted." The temperature and proportions of the acid may be varied.

The sulphate of alumina thus obtained may be treated with carbonate of lime, as described in N° 2407, 1864, " in order to " yield a cake of sulphate of alumina ;" or, " to obtain a cake free from silica, the solution may, when chemical action has ceased, be diluted so as to obtain the precipitation of the silica and undissolved clay which may be contained therein, " and this solution " again concentrated and treated with carbonate of lime." " To " obtain a sulphate of alumina free from insoluble matter, the " above clear liquor, when sufficiently concentrated, may be " allowed to cool to yield the cake required, or the sulphate of " alumina obtained by these means may be used in the manufac-" ture of alum."

[Printed, 4*d*. No Drawings.]

A.D. 1865, April 8.—N° 1011.

HUNTER, Andrew George.—" Improvements in the manu-" facture of soda and potash." These are, " converting the sul-" phate of soda or sulphate of potash into caustic soda or caustic " potash by means of caustic lime under pressure, and the pro-" duction of marketable caustic soda or potash, or of the carbo-" nates of soda or potash, and the production and utilization of " the sulphate of lime," as follows :—Good results have been obtained " with sulphate of soda by boiling a solution of sp. gr. " 1·100 at a pressure of from 40 to 50 pounds per inch, and with " sulphate of potash by boiling a solution of sp. gr. 1·100 at a " pressure of from 80 to 90 pounds per inch." The undissolved sulphate of lime is separated " by filtration or subsidence and " decantation," and washing with water alone it may be used as a manure. If sufficiently washed in this way, or " with sulphuric

" or hydrochloric acid, it may be converted into plaster of Paris " or applied to any purpose for which sulphate of lime is used." It is " advantageous to filter or settle the sulphate of lime under " pressure in order to prevent the caustic soda or potash reacting " on it." From the liquor is manufactured caustic soda or potash and carbonate or bicarbonate of soda or potash. " The liquor " may be carbonated either by exposure to or injection of carbonic " acid, or by concentrating the caustic alkaline liquor in contact " with a carbonate of lime which yields its carbonic acid to concentrated caustic soda or potash, and the caustic lime thus " produced may be used to causticize sulphate of soda or sulphate " of potash, or if it has been produced by carbonating caustic " potash it may be saturated with chlorine, and used for making " chlorate of potash."

[Printed, 4*d*. No Drawings.]

A.D. 1865, April 24.—N° 1144. (* *)

CLARK, William.—(*A communication from Messieurs Neyret, Orioli, and Fredet.*)—" Improvements in washing or steeping and " bleaching textile or fibrous materials."

These are using ammoniacal water for the above purpose as follows:—Two distinct apparatus are employed, the first consists " of a closed steeping apparatus, properly so called, which may " be either fixed or made to rotate and furnished with an agitator " or stirrer in its interior, the apparatus being heated either by a " furnace or by the admission of steam at a suitable pressure."

" The second apparatus consists of a condenser, which is " hermetically closed and placed in communication with the " steeping apparatus by means of a cock, when the steeping " operation is terminated, the condenser being cooled at the same " time." The ammonia is collected, the water is run off from the second vessel, and " the washing process proceeded with, as " ordinary. The ammoniacal water in the condenser is then " supplied with a little fresh ammonia to compensate for the " slight waste which is inevitable, and may then serve again for a " similar purpose." This process may " be employed with advantage for bleaching generally, as in paper making, all kinds " of dyeing in bleach works, and for domestic washing purposes; " in the latter case and for fabrics generally a pressure of about " two atmospheres is sufficient, the stirring being unnecessary."

" The apparatus may be heated in an open fire, taking the pre-" caution to place a vessel concentrically in the interior of the " apparatus. This vessel is pierced with holes," the fabrics are placed in it. After steeping the use of soap is unnecessary, "it " being sufficient to rinse the linen or other fabrics in pure water."

[Printed, 4*d*. No Drawings.]

A.D. 1865, May 5.—N° 1255.

HENDERSON, William.—" Improvements in extracting cop-" per and several other metals from certain ores of these metals." In the processes described in this Specification for obtaining copper and other metals from these ores it is stated that the patentee has found that the perchloride of iron by long contact " decomposes and dissolves the red oxide and sulphurets of " copper," and " to convert the protochloride of iron into per-" chloride of iron," " a combination of one or more " of the following " methods as circumstances permit " is employed. " 1st, " the protochloride liquor is stirred up and agitated with a small " proportion, say 1 lb., of finely powdered peroxide of manganese " to 100 gallons of liquor, and run out into shallow ponds or " vessels and exposed to the air and sun ; the liquor is afterwards " pumped up and repeatedly passed through walls or surfaces of " thorns or brushwood, as is well known and practised for the " manufacture of salt from poor brine springs, and is called " graduation." A red liquor remains after settling, which is put into " dissolving tanks on to fresh copper ore ; the metal is again " readily dissolved, and is again precipitated by metallic iron and " the resulting protochloride solution oxidized as above described." 2nd, long exposure of the solution to air in shallow ponds, pits, or vessels, or by exposure as above, but a small quantity of " per-" oxide of manganese very much facilitates the operation," and it is preferred to use it. 3rd, pumping up the solution so concentrated to a reservoir or cistern over a condenser, the tower in preference being filled with bricks or pebbles, a second tower in conjunction being filled or partially so with coke. In connection with these towers or condensers is a reverberatory furnace in which is the copper ore rich in silica at a dull red heat, and with this solution the ore is repeatedly moistened and allowed to dry. The gases chlorine, hydrochloric acid, perchloride of iron and water are condensed in towers.

[Printed, 4*d*. No Drawings.]

A.D. 1865, May 5.—Nº 1263.

BENNETT, Solomon. — " Improvements in brewing, distillation, the production of vinegar, and the extract of malt and " other grain." These are, first, producing the extract of malt from the meal alone of malted grain by separating and removing the husk or offal therefrom.

Second, the synthetical treatment of the meal by a gradual process after its separation until its entire conversion into one wort, and the principle of exhausting the goods by gradual or progressive reduction of liquor for conversion in one gyle, by never allowing the soluble diastase to be removed or killed until the complete solvency of the goods is effected by the immediate or intimate union or contact of diastase, and the action of catalysis in mashing.

Third, the keeping of the process as much as possible from the influence of oxidation, and maintaining each process at one uniform or initial temperature, for such processes the temperature of the mash tun room and respective floors being likewise regulated and maintained.

Fourth, covered mash tuns with rose or perforated under cover, the arrangements for the supply of liquor, and the screw blade with projections or pins thereon for kneading or commingling the goods.

Fifth, improvements in the fermenting square and rounds.

Sixth, the method and process of reducing the lengths of the fermentation.

Seventh, the improvements in distillation by the employment of the meal alone.

Eighth, producing vinegar by using the meal alone, which is to be kneaded and macerated at a temperature of about 155° F., which must scarcely ever exceed 160°, so that after boiling, the foreign substances shall be coagulated. The wort thus converted is fermented in squares in which are moving shafts with arms, at a temperature of 65°, rising to 70°, which temperature is maintained by the addition of cold liquor, and "acidified by any well-" known means."

Ninth, the application of the improved mash tun to mash malted grain, as hitherto used by brewers, the husk or offal not being removed.

Tenth, the general arrangement of apparatus and system of *operation*.

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1865, May 19.—N° 1385.

RICHARDSON, THOMAS, and RÜCKER, MARTIN DIEDERICH.—"Improvements in obtaining certain compounds of nitrogen "and of sulphur." These are, the oxide of iron when it ceases to act beneficially on coal gas, and "is known under the name of "gas refuse," is exposed in a tank to the action of "water, or "with a solution of sulphate of potash, soda, or magnesia, or "with mixtures of the same." Different quantities of these solutions are employed, according to "the per-centage of ammonia "and other nitrogenous compounds present," ascertained by "a "preliminary experiment on a small scale." "The liquor is "evaporated in a metal pan by steam heat or by a fire underneath." "These salts, either in the crystalline form or dried "up by sawdust, when treated with lime in the same manner as "gas liquor, yield ammonia, which can be converted into sulphate "or muriate of ammonia by passing the gas into either sulphuric "or muriatic acid in the usual way." The residue of the gas refuse after lixiviation, drained and dried, is mixed with from 10 to 20 per cent. of sulphur, and burned "in any ordinary sulphur "kiln for the production of sulphurous acid in and for the manu"facture of sulphuric acid."

[Printed, 4*d*. No Drawings.]

A.D. 1865, May 19.—N° 1386.

DAVEY, WILLIAM.—"Improvements in apparatus for washing "or purifying coal gas, and for producing ammoniacal water "therefrom." These are, first, "constructing apparatus for "freeing coal gas from ammonia and bisulphide of carbon, con"sisting of a closed vessel having a central chamber, the lower "end of which dips slightly beneath the level of the water or "other fluid contained in the vessel, and from which immersed "edge of the chamber a grating or perforated or gauze dia"phragm, also slightly immersed beneath the level of the fluid, "is made to extend to the sides of the vessel, so that the gas "being made to pass into the central chamber depresses the fluid "so as to pass under its lower edge and beneath the grating or "diaphragm, whence it rises through the openings or perfora"tions thereof, and through the shallow stratum of water over "the grating into the space surrounding the central chamber."

Gas, tar, or other fluid may be used in place of water to free the gas from bisulphide of carbon.

Second, placing on the diaphragm "a layer of pebbles or other "suitable granular substance, in order the more effectually to "bring the bubbles of gas into intimate contact with the "fluid."

Third, "constructing the central chamber with its lower end "immersed some depth into the fluid, and widened out, and "forming in such immersed portions perforations or small "openings, in such manner that the gas in depressing the fluid "inside the chamber uncovers such perforations or openings so "as to escape through them."

Fourth, "the employment of a series of two or more such "before-described apparatus acting in combination with each "other and with the system of pipes and valves."

[Printed, 10*d*. Drawing.]

A.D. 1865, May 29.—N° 1467.

FONTAINE MOREAU, PETER ARMAND LE COMTE DE.—(*A communication from Louis Poulet.*)—(*Provisional protection only.*)—"Certain improvements in the manufacture of lime." These are, dispensing with the use of kilns, "the baking taking "place on the spot where the calcareous materials are found" by "preparing on the ground, first, a layer of wood, coke, coal, or any "other suitable fuel; on this layer the calcareous substances are "laid; on these another layer of combustible material is placed, "and on this latter is placed a second layer of calcareous sub-"stances, and so on alternately." "In the interior of these "layers a place or places is or are provided for the setting of the "shaft or chimney for obtaining the required draught."

[Printed, 4*d*. No Drawings.]

A.D. 1865, June 10.—N° 1579. (* *)

DENTITH, JOSEPH MAYER.—(*Provisional protection only.*)—"Certain improvements in the manufacture and production of "chromate and bichromate of potash employed in dyeing and "printing woven fabrics." These are, "the combination and "admixture of felspar and other well-known potash-producing "rocks with chromate of iron or oxyde of chrome, in the propor-

" tion of about twenty parts of potash-producing rock added to " seven parts of chromic ore, and subjecting such materials when " in combination to a bright red heat, say about one thousand " nine hundred Fahrenheit, which will thereby produce a superior " and inexpensive potash required for the purpose" of " dyeing " and printing calico, woollen, or other textile woven fabrics."

[Printed, *4d.* No Drawings.]

A.D. 1865, June 13.—N° 1602.

ROUTLEDGE, THOMAS, and RICHARDSON, WILLIAM HENRY.—" Improvements in the manufacture of paper and paper " stock, and in the utilization of certain waste products resulting " therefrom." These are, first, " treating esparto or alfa, straw, " and other fibrous substances, or rags, in the boiling process " with leys obtained from the lixiviation with water of black balls, " as usually manufactured in alkali works, or specifically made " for the purpose."

Second. " Pressing by hydraulic pressure, or otherwise, the " fibrous materials after being boiled and drained, or subjecting " them to the action of a centrifugal hydro-extractor, or of india-" rubber, vulcanite, or other suitable rollers, so as to press out and " save the whole or as much as possible of the alkaline and " extractive matter ; and also flatten and open the fibres and free " them from extraneous matter ready for conversion into 'stock' " or for bleaching."

Third. " Boiling down the liquor obtained by the above process " of pressing, either alone or together with the spent leys or " waste liqours obtained from our first process, or spent leys or " waste liquors produced in the ordinary manner, and incinerat-" ing the mass so produced ; the resulting mass may be lixiviated " in the usual way, and the liquors so obtained may be used " alone or mixed with the leys at present employed for treating " esparto or other fibrous material or rags."

Fourth. " Adding coal, coal tar, pitch, or other suitable sub-" stance to the pasty mass, either alone or with any of the " substances hitherto used, or which are capable of being em-" ployed in the balling process of the alkali works."

Fifth. " Adding to the leys or liquors so obtained, or to the " product obtained by boiling them down, either caustic or " hydrate of baryta, carbonate or bicarbonate of baryta, or any

" suitable salt of baryta, and applying the solution, thereby puri-
" fied, for boiling esparto, straw, or other vegetable fibrous
" substances, or rags."

Sixth. "Using the pasty mass resulting from boiling down
" the said waste liqours for preventing incrustation in steam
" boilers."

Seventh. "Using an aqueous solution of chlorine gas in lieu
" of a solution of bleaching powder, or in using a solution of
" chlorine in water containing magnesia, alumina, soda, or potash
" for bleaching esparto and other fibrous substances, or rags, and,
" if desirable, increasing the energy of the bleaching agent by the
" addition of sulphuric, muriatic, oxalic, tartaric, or acetic acids,
" or any one or all of them."

[Printed, 4*d*. No Drawings.]

A.D. 1865, June 13.—Nº 1605.

LAURENT, François Alexandre, and CASTHELAZ, John.—(*Provisional protection only.*)—" Improvements in the manu-
" facture of phthalic acid and chloroxynaphthalic acid, and in
" dyeing and printing." Naphthaline is treated with hydrochloric acid and alkaline or earthy chlorates; shaking them together when cold a mixture is formed "consisting principally
" of bichloride of naphthaline and bichloride of chloro-naphtha-
" line. The mixture of these two bichlorides, either purified or
" not, is oxidized by means of nitric acid and heat," preferring
" to work with a bain-marie; in this manner a mixture is obtained
" consisting of phthalic acid of choride of chloroxynaphthyle,
" accompanied with a residue. By treating with boiling water the
" phthalic acid is separated, and it crystallizes on cooling. The
" remainder, when treated by alkalies or the salts formed by them
" with weak acids, gives a solution of a salt of chloroxynaph-
" thalic acid. This solution treated with a mineral acid
" gives chloroxynaphthalic acid, still however in an impure
" state; to purify it, it is dissolved in water in the presence
" of a base or of a salt, which seizes on the impurities and holds
" them in an insoluble form." The phthalic acid is employed for the manufacture of benzoic acid in the manner described in No. 263, 1865. Fabrics, fibres, or yarns and paper are dyed and printed with chloroxynaphthalic acid.

[Printed, 4*d*. No Drawings.]

A.D. 1865, June 17.—N° 1634.

DELTOUR, WILLIAM. — (*Provisional protection only.*)—" An " improvement in the preparation of vegetable fibre for the " manufacture of paper." This consists " in reference to this " subject in preparing a caustic alkaline solution as hereafter " named, and then boiling the vegetable fibre in the same." " The caustic alkaline solution (which is to be made of about " four degrees of strength by the ordinary or soap-boilers' glass) " is prepared in a vessel provided with steam pipes in the bottom, " perforated so that the escape of steam will agitate and heat the " mass." " Water with about equal proportions of soda ash and " quicklime " are introduced, and heated with the steam. " The " proportion of water must be obtained by experience, according to the quality or condition of the soda ash and quicklime." " The first lye thus produced is drawn off through a gate into " a receptable, and more water is added from time to time until " the caustic alkali is taken up."

[Printed, 4*d*. No Drawings.]

A.D. 1865, June 20.—N° 1649.

MINGAUD, PHILIPPE.—(*Complete Specification, but no Letters Patent.*)—" Improvements in obtaining jellies, syrups, drinks, and " other products from the tree arbutus unedo, known as the " arbutus." These are, in reference to this subject, as follows :— " Vinegar is obtained by leaving the fruit and an equal quantity " of water in a receptacle until acid fermentation takes place, then " pressing out the juice and filtering; the vinegar thus obtained " is of a fine rose color, and agreeably sharp." The other processes have reference to the obtaining of jellies, syrups, drinks, colors, &c. &c.

[Printed, 4*d*. No Drawings.]

A.D. 1865, July 6.—N° 1785.

CLAUS, CHARLES FREDERICK.—" Improvements in obtaining " sulphates and carbonates of potash and soda." These are said to be " the separation of sulphate of potash from sulphate of " soda (after the said mixed sulphates have been obtained from " mixed chlorides by the decomposition thereof with sulphuric " acid) by treating these mixed sulphates with water, so as to

" bring the sulphate of soda into a state of solution, whilst the " sulphate of potash is in a solid state." " The rock salt of " Stassfurt, in Prussia, or similar rock salt containing a large per- " centage of chloride of potassium," is employed as it is, or refined, by " which the per-centage of chloride of potassium has " been increased by crystallization," mixing with about ½ a ton of the salt, in this case refined, " by preference, rather more than " its equivalent, viz., 9 cwt. of sulphuric acid of 140° Twaddle," in a decomposing pot, and afterwards it is transferred to the roasting furnace, and the heat carried to " a cherry red heat." Where the fuel and construction of the roaster will not admit of the application of such a heat, a small reverberatory furnace is added; " one similar to an 'ash finishing furnace' will answer " the purpose, and the waste heat from it may be applied to the " working of the ordinary roaster." The roasting is complete when " fumes of muriatic acid ceases to be emitted." " The " separation of the mixed sulphates can be effected conveniently, " either by completely dissolving them both together, and boiling " down the solution until the sulphate of potash is deposited, " leaving the sulphate of soda in solution, or by grinding the " mixed salts into a fine powder, and adding water to the powder " to dissolve out the sulphate of soda, and leave the sulphate of " potash undissolved." These modes are fully described. The sulphate of potash dried is made into carbonate by a process " quite " similar to those called Leblanc's alkali process from common " salt."

[Printed, 4*d*. No Drawings.]

A.D. 1865, July 10.—N° 1818.

LIVESEY, GEORGE THOMAS.—" Improvements in treating " ammoniacal liquors for purifying gas and other purposes." These are, in reference to this subject, " the desulphuration of " gas liquor, wholly or in part containing ammonia and sul- " phuretted hydrogen, by bringing the liquor into contact with " the gases produced by the combustion of fuel, or the like gases " from other sources," by " drawing or forcing the same, by " means of an exhauster or other suitable apparatus, through or " into contact with the foul gas liquor, which may be contained " in a vessel similar to the ordinary scrubber, wet lime purifier, or "washer, such as is used in gasworks, or any other contrivance, "whereby the necessary amount of contact can be obtained." "The carbonic acid may be removed from the gas by desulphurating the liquor as before described, and then heating it, by which means the greater portion of the carbonic acid is driven off, and the said liquor then becomes suitable as an agent for the removal of both sulphuretted hydrogen and carbonic acid. The process of heating the liquor has the effect of driving off with the carbonic acid a portion of ammonia, but this is readily condensed, and is a valuable product." The desulphuration of the ammoniacal liquor may be effected by substituting atmospheric air for the gases, but the latter are preferred on account of their greater efficacy. The sulphuretted hydrogen and small quantity of ammonia driven off are passed through or in contact with water, the ammonia is absorbed, and "the sulphuretted hydrogen is conducted into the chimney shaft, or burnt in the furnace."

[Printed, 4*d*. No Drawings.]

A.D. 1865, July 11.—Nº 1831.

DUFRENÉ, Hector Auguste. — (*A communication from Viscount Charles de Secqueville.*)—(*Provisional protection only.*)— "Improvements in the treatment of copper and nickel ores." These are, in reference to this subject, as follows:—First. "The ground ore or the schlick thereof is to be roasted along with about five per cent. of the residuum of the manufacture of nitric or azotic acid, and the acid condensed with water in a tower or shaft 8 yards high containing coke."

Second. After roasting as above it is crushed by rollers, &c., and roasted with "about 15 per cent. of a compound mixture of equal parts of common sea salt, bioxide of manganese, and of the residuum of the manufacture of nitric acid." After this second roasting, the ores are "arranged in large heaps, and for the term of a week or so these heaps are to be sprinkled over once each day, or thereabouts, with the acid waters coming from the tower containing coke." The ores having been thus washed, the liquid is saturated by concentration, the gold, if the ore is an auriferous one, is precipitated under the action of the dissolved salts of iron, and "the copper is afterwards precipitated from its solution by means of granulated pig iron," and fused and run into ingots. The remaining solutions containing the salt of iron are concentrated, and "the green vitriol or sulphate of iron" crystallized out. "The mother waters may be used

" again to sprinkle over the above-mentioned heaps of calcined or " roasted ore." When the ores, &c. " contain at the same time " copper and nickel, the preceding operations remain exactly the " same " up to obtaining the copper, and likewise the sulphate of iron, after which the mother liquors undergo a series of operations until the " spongious nickel is obtained, which is to be remelted " and reduced into regulus by the ordinary means."

[Printed, 4*d*. No Drawings.]

A.D. 1865, July 11.—N° 1833.

DUFRENÉ, Hector Auguste.—(*A communication from Charles Tellier.*)—(*Provisional protection only.*)—" An improved " process for obtaining oxygen." This is, in reference to this subject, as follows:—" When a current of dried chlorydric (chlorhydric?) acid and air is passed over pumicestone at a red heat in " a suitable apparatus, decomposition of the acid takes place. The " hydrogen unites with the oxygen of the air to form water, and " azote and chlorine, which may be easily separated, can be " collected. When, on the contrary, a mixture of chlorine and " water steam is passed through a tube heated to red heat, " decomposition takes place, but in this instance hydrogen combines with the chlorine (forming hydrochloric acid), and oxygen " is set at liberty." " From the preceding re-actions," " a very " large quantity of azote is eliminated," to utilize which, it is passed over red-hot iron " in a spongious state," by " which the " azote is absorbed," and when hydrogen is " brought on the " combination of azote and iron thus formed, the decomposition " is immediate," and a " large quantity of ammonia " is produced. The oxygen gas produced as above is applied " principally to the " production of heat and light, by burning in this gas several " substances, but especially metals," among which are named, " sulphurous cast iron " and zinc. In the first case it is said a " pure " oxyde " is obtained, and " the oxyde formed in both cases is " reduced by the ordinary means."

[Printed, 4*d*. No Drawings.]

A.D. 1865, July 19.—N° 1877.

McCRUMMEN, Donald.—(*Provisional protection only.*)—" An " improved process of preparing seaweeds and other vegetable " substances for the production of artificial guano, felt, alkaline

" salts, and iodine." This " consists in the new principle of first " separating the soluble from the insoluble portions of the sea- " weeds and other vegetable substances," as follows :—" A quantity " of the seaweed or other vegetable substance, after being crushed " or bruised, is placed in a boiler, and therein acted upon by " boiling water or steam, with or without pressure; the soluble " portions are thus extracted and separated from the insoluble, " leaving the insoluble residuum to be converted into guano or " felt, by processes in common use. The soluble extract or solu- " tion obtained is employed for the production of alkaline salts " and iodine by the ordinary processes."

[Printed, 4*d*. No Drawings.]

A.D. 1865, July 21.—Nº 1905.

CHAUDET, JEAN HENRI.—" An improved system of manu- " facturing salts, sulphates, and acetates of chrome, and of applying " them as mordants in dyeing and printing textile substances, " both animal and vegetable." This consists, in reference to this subject, as follows :—Sulphurous acid brings back " to a " state of base chromic acid, either isolated or in combination," and there are formed sulphates and sulphites of chromium, and it is this conversion which is here utilized, as follows :—" In a cast- " iron retort, forming a continuation of the bellows or blowing " machine," is sulphur, which is lighted, and by means of a bellows the sulphurous acid is blown through a washer, and " into the solution of chromate, which takes it up, and the azote " of the atmospheric air disengages itself from the apparatus. If " bichromate of potash or of soda is employed, sulphates and " sulphites of chrome and of potash or of soda are formed, which " remain dissolved." If chromate of lime, baryta, or lead be employed, an insoluble " sulphate of the base precipitates, and " sulphate of chrome remains in solution," and it is by means of these salts, or other analogous salts, that sulphate of chrome is obtained " of fairly pure quality, in separating by filtration the " insoluble sulphates so formed." In preference employing the bichromate of lime obtained from the treatment of chrome ore by lime. The hydrated oxide of chrome is precipitated from the sulphate by means of ammonia or the alkaline carbonates. " By " adding to the chromates the equivalent of sulphuric acid of the " base combined with the chromic acid no sulphites are formed."

" Acetates, nitrates, citrates, and tartrates of chrome " are easily obtained " by double decomposition."

[Printed, 4*d*. No Drawings.]

A.D. 1865, July 22.—N° 1914.

GILLARD, JOSEPH PIERRE.—" Improvements in the manu-" facture of soda and carbonate of soda." These are said to be improvements upon N° 1790, 1861, and are as follows :—In place of conducting the process merely in a retort, employing a reverberatory furnace or a very large vessel of suitable shape placed in a suitable furnace ; the salt is melted and rendered quite liquid, and acted upon " with dissociated steam, viz., superheated steam " brought into the nascent or decomposed state," by causing the steam to pass first through tubulated blocks or large pieces of " cast or wrought iron, steel, or other suitable metal or material, " and from thence through highly heated pipes of platinum, " provided in the inside with a large number of diaphragms or " partitions of platinum wire gauze, perforated plates of platinum, " or bundles of platinum wire." The steam is heated to a temperature of " 1800° Fahrenheit," and is conducted by means of a pipe or pipes of platinum, having dispersing roses or holes, into and among the liquid salt, so that it may bubble up through the salt, or the " dissociated steam may be made to impinge on the " surface of the liquid salt, or of a thin layer of this latter falling " gradually from the retort or other vessel " into one or more highly heated vessels, caustic soda is formed, and hydrochloric acid gas evolved is " allowed either to escape in the air or to be " condensed in water by any of the known methods. The caustic " soda, whilst in the liquid state, is allowed to run off in suitable " receiving vessels ; or the same may be converted into carbonate " or bicarbonate of soda by blowing a stream of carbonic acid " gas into it." The process and apparatus, and the general arrangement and combination of parts of the apparatus, are claimed.

[Printed, 8*d*. Drawing.]

A.D. 1865, July 25.—N° 1933.

PRICE, ASTLEY PASTON.—(*A communication from Dr. Hugo Kunheim.*)—(*Provisional protection only.*)—" Improvements in the " manufacture of carbonate of ammonia, and in the utilization of

" the product obtained in such manufacture." These are, " the " employment of carbonate of baryta as a substitute for carbonate " of lime, now generally employed in conjunction with muriate of " ammonia for the production of carbonate of ammonia. The " residual chloride of barium resulting from this decomposition " by the application of heat may be employed for the production " of sulphate of baryta or other pigments, or may be employed " for other useful purposes in the arts." The above decomposition may be effected in apparatus similar to that now in use, as is well understood.

[Printed, 4*d*. No Drawings.]

A.D. 1865, July 26.—N° 1936.

RICHARDS, William, and RICHARDS, Joseph.—" Certain " improvements in the manufacture of sal-ammoniac." These are, condensing " the whole of the gases which arise during the " operation of sublimation," as follows: — Constructing the sublimating pot in the usual manner, but placing upon its top " a pipe, which is to convey the surplus gases to a tank or con" denser containing water, ammoniacal liquor, or other suitable " fluid; one end of the pipe being fixed to the top of the dome," the other end is carried to a suitable distance into the water or other fluid contained in the tank or condenser, " by which the " surplus gases will be absorbed." To prevent the occurrence of any accident by reason of an unusual pressure of gas, there may be a safety valve placed upon the condenser." " Since the pots in " which the chloride of ammonia is sublimed are generally made " of iron, the product sal-ammoniac would be likely to become " discoloured or stained by contact therewith," it is here proposed " to coat the interior of the dome and all other necessary parts of " the apparatus" " with a lining of carbon, or carbon and silica, " or carbon and fire-clay, or some other suitable preparation, by " means of which the product may be kept free from metallic " impurities."

[Printed 10*d*. Drawing.]

A.D. 1865, August 11.—N° 2087.

JEE, Horace.—(*Provisional protection only.*)—" Improvements " in the manufacture of table salt." These are, producing

" coloured salt for table use," by adding a pigment of the desired colour during the 'boiling down' of the brine or subsequently during roasting, grinding, or preparation of the salt for sale. It is preferred, " however, to add a delicately tinted colouring matter, " say, some of the lighter aniline dyes, to the brine just at the " time it is being evaporated."

[Printed, 4*d*. No Drawings.]

A.D. 1865, August 14.—Nº 2100.

LOCKEY, James Thomas.—" Improvements in and connected " with the manufacture of copper." These are, first, " the use " or employment of a jet or jets of steam or other elastic fluid at " pressure," as follows :—There are a pair of ordinary furnaces, from which the flue departs and gradually contracts until some little way on a pipe " from a steam boiler or from a vessel containing an elastic fluid at high pressure is entered ;" its opening is turned from the furnaces. The flue, after passing this point, begins to increase in sectional area and size, " the greater the increase in " sectional area and size the more beneficial will be the results in " practice." The bottom of the flue, " when it is of considerable " length, and is kept partially filled with cold water, might serve " to condense the vapours and gases to such an extent that " scarcely any gas or vapour would escape at the end thereof into " the air."

Second. " The use or employment of a condenser in which the " vapour or gases to be condensed or absorbed are not allowed to " come into contact with the condensing fluid," as follows :—The condensing pipes are fixed in the usual way, and there are two pipes in the outer casing, one at top and the other at bottom " to " bring and convey away " the water. If " there be any considerable quantity of sulphurous acid gas from the end of the flue," " either when it is or is not fitted with the surface condenser," a " jet of nitrous gas may be injected " and the " gases conveyed to " a vitriol chamber."

Third. Another condenser of a square shape, built of bricks or other materials, with ledges to support a series of " grids or " trays," on which are " peat, leaves, or other vegetable substance " or substances. The bottom part may be lined with lead," &c. and a rose at top sprinkles " cold water when required."

[Printed, 10*d*. Drawing.]

A.D. 1865, August 19.—Nº 2142.

BERNHARD, Isaac.—(*A communication from Jean Vincent Prosper Lagrange.*)—(*Provisional protection only.*)—"Improve-" ments in the manufacture of artificial saltpetre." These are as follows:—"On mixing 157 parts of nitrate of lead with 39 parts " of carbonate of ammonia, carbonate of lead and nitrate of " ammonia are obtained. To the nitrate of ammonia thus " obtained 28 parts of lime are added, by which nitrate of lime is " produced, and ammoniacal vapours are given off, which are col- " lected in the usual way; the nitrate of lime remaining is mixed " with 87 parts of sulphate of potash," the sulphate of lime pre- " cipitates, and the solution, "on being concentrated, yields salt- " petre in crystals. Instead of mixing the nitrate of lime with " sulphate of potash 70 parts of sulphate of soda may be em- " ployed, which would give sulphate of lime and nitrate of soda, " and on boiling the nitrate of soda with 72 parts of chloride of " potassium nitrate of potash or saltpetre is formed." The carbonate of lime heated in a kiln gives off its carbonic acid, which is introduced into a condenser with the ammoniacal vapours above mentioned, thus producing lime necessary for decomposing the nitrate of ammonia and "carbonate of ammonia, which in turn is " employed for treating a fresh supply of nitrate of lead." "A " simpler mode of operating is as follows:—157 parts of nitrate " of lead are mixed with 93 parts of carbonate of soda, by which " white lead and nitrate of soda are formed; the nitrate of soda " on being boiled with 74 parts of chloride of potassium produces " nitrate of potash or saltpetre, and chloride of sodium or common " salt." "The separation of these two products is easily effected, " the saltpetre being produced in crystalline masses."

[Printed, 4*d*. No Drawings.]

A.D. 1865, August 29, Nº 2216.

GURLT, Adolph.—"Improvements in condensing and utilizing " sulphurous smokes and vapours, and in apparatus to be used " for that purpose." These are, "the condensation and utiliza- " tion of such sulphurous smokes and vapours as are generated " in alkali or chemical works, or in certain smelting works, such " as copper, spelter, or lead, and other works." "Many attempts " have hitherto been made to utilize sulphurous smokes and "vapours in the wet way," but this process consists in doing so "in the dry way." This process "is based on the chemical facts "that vapours of sulphurous and sulphuric acids brought in contact with carbon or with carbonic oxide, sulphuretted and carburetted hydrogen and hydrogen gases at a high temperature "are immediately decomposed," free sulphur being formed, and the oxygen of both acids combining with "the carbon and hydrogen "of the other substances." This is effected "by the use of a "consumer, consisting of inclined fire-grates for the reduction of "the said smokes and vapours by means of ignited carbonaceous "substances in combination with a large chamber for the action "of the undecomposed gases upon each other; also combining, "with the said consumer, a suitable cooling and condensing "apparatus, and an exhauster, fan, or ventilator driven by "mechanical power; also combining with the said consumer and "condenser, an air filter of any suitable size and construction "which will allow of the separation of the flowers of sulphur from "the cooled gases or vapours."

[Printed, 10*d*. Drawing.]

A.D. 1865, August 31.—N° 2247.

NEWTON, William Edward.—(*A communication from Albert Hamilton Emery.*)—"Improvements in obtaining spirits of turpentine, rosin, pitch, tar, pyroligneous acid, and other products "from wood." These are, distilling spirits of turpentine directly from wood, and obtaining rosin and pitch directly from wood by distillation. "The wood (pitch pine wood) is placed in iron "retorts, which are closed up steam-tight, and a stream of steam "is let into the retorts, which may be heated externally. As soon "as condensation of the steam ceases, or partially ceases, the "pressure in the retort forces the heat through the mass until the "heat reaches 300° or 320° F., when the valve into the condenser "is opened and the vapours pass into it and are condensed. The "pressure of the steam in the retort is not generally allowed to "reach more than three or four atmospheres before it is again "reduced." In reference to this subject they are, shutting off, or nearly so, the supply of steam or superheated steam from the retort in which pyroligneous acid is being distilled from wood during a portion of the time that the acid is being distilled off, the steam or superheated steam being used first to thoroughly dry and heat the wood. "As soon as the yield of the spirits of tur-"pentine becomes inconsiderable, the heat is raised and the "charring commences, and as soon as this progresses rapidly, the "steam may be nearly or quite shut off, and the acid formed will "be much stronger than if the supply of steam be kept up during "the entire distillation."

[Printed, 4*d*. No Drawings.]

A.D. 1865, September 2.—Nº 2267.

ELLIS, HENRY.—"Improvements in the manufacture of com-"pounds of silica, and in the production of silicated alkaline "inks, colours, and dyes." These are, in reference to this subject, "the methods of producing the soluble alkaline silicates, super-"silicates, and compound silicates substantially" as follows, "or "any mere modifications thereof:"—To manufacture "compound "silicates containing a larger proportionate quantity of earthy or "metallic silicate in solution than is contained in the compound "silicates previously manufactured;" this is effected "by adding "free acid to the neutral, earthy, or metallic solution which is to "be used for the preparation of the compound silicate." Prepar-ing "ammonia-silicates of soda and potash, and of the earths and "metals" by "precipitating the commercial silicates of soda or "of potash by means of carbonate of ammonia or chloride of "ammonia, or by means of ammonia-alum or ammoniated solu-"tions of the earthy salts, or by means of ammonia-chlorides or "ammonia-sulphates of the metals and redissolving the precipi-"tates so obtained in solutions of silicate of soda or of potash." Tungsto-silicates "are prepared by adding a solution of tungstate "of soda to a solution of silicate of soda and precipitating by "means of an acid, or by means of a solution of an earthy or "metallic salt, and afterwards redissolving the precipitate," as described in No. 2645, 1862. "For producing compound soluble "silicates of lime and magnesia in combination with alkalies, sea "water, either alone or acidulated, may be added to a solution of "any ordinary commercial silicate of soda or of potash," the precipitate "being washed and redissolved in a concentrated solu-"tion of commercial alkaline silicate." By adding newly preci-pitated silicic acid, gelatinous silica, precipitated silicate, or com-pound silicate moist, to solid hydrate of potash or soda solutions of salts are obtained in a purer state than by the process described in No. 2645, 1862. The remainder of the Specification refers to the making inks, colours, and dyes, by adding these silicates to different colors, &c.

[Printed, 6*d.* No Drawings.]

A.D. 1865, September 6.—N° 2289.

NICHOLSON, Thomas.—"An improved process of and ap-" paratus for making caustic liquor or caustic lees." These are, "arranging the vats in a consecutive series, so that liqour may be "run throughout the series," as follows:—Six vats, in preference cylindrical, and surrounded "with a steam jacket, which extends "below the bottom of the vats." "The steam jackets of the "several vats are connected by means of branch pipes to supply "and discharge" two pipes which "are provided with cocks and "valves for admitting or discharging the contents to and from "any or all of the steam jackets at pleasure." The interior of the several vats are also connected with each other by means of pipes governed by cocks, "which permit of the liquor being run "from the first vat of the series to every vat in succession. The "first and last vat are also connected directly with each other by "a pipe and cock," which "may be opened or closed at pleasure." The mode of operating is as follows:—Vat N° 1 is charged with carbonate of soda and lime, hot water is run into it from an elevated cistern, and the contents are boiled by steam into the jacket. After boiling, the whole is allowed to settle. A quantity of carbonate of soda and lime is put into N° 2 vat, and "by con-" tinuing to run on water into vat N° 1, vat N° 2 will be supplied "with sufficient water for boiling its contents; the supply is then "to be stopped and steam admitted to the jacket of vat N° 2, until "the liquor has become as caustic as in N° 1 vat. In like manner "is N° 3 charged and the contents operated on, and so on with "all the vats of the series. When the liquor is considered to be "sufficiently strong, or as strong as practicable, it may be syphoned "off." If the liquor is desired stronger, N° 1 vat is cleared out and fresh carbonate of soda and lime is put into it, and the liquor from N° 6 is drawn into it.

[Printed, 10*d.* Drawing.]

A.D. 1865, September 9.—N° 2314.

CASTHÉLAZ, John, and BASSET, Nicolas.—"Improve-" ments in the manufacture of oxalic acid." These are, "in a

" mode of employing nitric acid as an oxidizing agent, and also " of employing certain matters not now commonly used in the " manufacture of oxalic acid." It is stated that, " heretofore the " nitric acid employed " " has been in a state of considerable con- " centration," it is proposed to use it dilute. The degree of dilution preferred is " 25° of Beaumé's scale," but " the result " can be obtained with a much more dilute acid." The substances employed " are all the substances containing hydrogen and car- " bon at present used in this manufacture, but particularly " animal refuse of all sorts " preferring " the flesh and blood of " horses," also employing " glycerine, peat, leather, hare skins, " and in short all refuse of an albumenal nature." The solid matters are submitted to the action of steam under a pressure of about 3 atmospheres " from one to four, or five hours, or more." " The matters are then put into dissolving pans heated in a sand " bath to a temperature which may be allowed to rise gradually " to 105° to 110° centigrade. They are then mixed with an equal " weight of nitric acid (sp. gr. 25° Beaumé), to which is added " ten per cent. of sulphuric acid (sp. gr. 66°) when the solution " is not produced with sufficient facility." " When the matters " are dissolved, the action of the heat is continued until the " density of the liquid is raised to 40° Beaumé or thereabout ;" the fatty matters rise to the top and are removed. " Nitric acid " (sp. gr. 25°) is then added little by little, in the proportion of " one-tenth of the volume of the liquid, which then takes a " beautiful amber tint. When the reaction is terminated the " liquid is put aside to crystallize," &c.

[Printed, 4*d*. No Drawings.]

A.D. 1865, September 14.—Nº 2350.

BELL, THOMAS, and BELL, THOMAS LESSLIE GREGSON.— " Improvements in apparatus used for calcining and roasting " copper and other ores, and substances containing sulphur." These are, the combination of apparatus " for calcining and " roasting copper, tin, and other ores and substances contain- " ing sulphur. The said apparatus consisting essentially of an " ordinary sulphuric acid chamber combined with a rotating retort, " the bottom of which is inclined, and into which the material is " fed continuously at one end and discharged at the other, pro- " vision being made for a regulated supply of air being maintained

" in the retort, so that the sulphurous acid formed in the calcining " and roasting operation may be led into the said sulphuric " acid chamber, and there converted into sulphuric acid."

[Printed, 10*d*. Drawing.]

A.D. 1865, September 22.—N° 2427.

SPENCE, Peter.—" Improvements in the manufacture of white " lead." These are said to be, "the production of 'white lead' " by treating substances containing oxide or carbonate of lead " with caustic alkaline solutions, and then precipitating the " required 'white lead.'" Oxide or carbonate of lead or substances containing them are powdered and treated by stirring until saturation with successive quantities of a solution of caustic alkali, caustic soda preferred, until all the oxide or carbonate in the substance is dissolved. Any ore that can by calcination or otherwise be brought into the state of oxide or carbonate is fit for this purpose. Galena, or such like substances, are calcined at a low red heat in a reverberatory or other suitable furnace until "converted " into oxide of lead and partly into sulphate of lead;" before stirring this into the caustic solution it is subjected "to the action " of a solution of soda ash;" but if it contains "any oxide of " copper or a large portion of oxide of zinc," in that case it is preferred "to use a solution of ammonia or carbonate of am- " monia," which removes sulphuric acid and oxides of copper and zinc. Should there only be in the matters a small portion of oxide of zinc, the precipitation of which would not be detrimental to the carbonate of lead, a solution of carbonate of soda is preferred for the removal of the sulphuric acid. Having dissolved the oxide or carbonate of lead in the caustic solution the clear liquid is drawn off, and the oxide of lead precipitated partly as oxide and partly as carbonate, in preference by means of carbonic acid as more economical, or by carbonate of ammonia, or bicarbonate of soda, &c.; the resulting carbonate of soda is causticised by lime and used over again as above. The precipitated white lead is well washed and dried.

[Printed, 4*d*. No Drawings.]

A.D. 1865, September 23.—N° 2443.

SCHAFFNER, Max.—" Improvements in treating soda waste " to obtain sulphur therefrom." These are, first, exposing the soda waste in heaps from 8 to 10 feet high "for about two months " or longer," or "until a sample from the interior of a heap " shows a dark yellowish green color, or assumes such color after " a few hours' exposure to the air," when it is thrown into a conical heap, and "in about 4 hours it becomes fit for the lixiviat- " ing process." After washing, until the liquid shows "no per- " ceptible trace of sulphurets," the soda waste is exposed to the atmosphere, in preference in long pits, and in preference from 30 to 40 feet long, 8 to 10 feet wide, and from 4 to 6 feet deep; this second oxidation "progresses much more rapidly than the first." The dark yellowish green color is again the test by which the progress of the process and sufficient preparation of the soda waste are judged of; "when it is lixiviated as before, again " exposed to become oxidated, and lixiviated a third time, all the " liquors of any strength are mixed together, and consist of poly- " sulphuret of calcium and hyposulphite of lime." "The weak " liquors are employed in the lixiviation of a fresh quantity of the " prepared soda water."

Second, "decomposing soda waste liquor containing polysul- " phurets and hyposulphites in suitable proportions," which is said to be the case when soda waste is treated as above, "by " pouring it whilst hot into muriatic acid." It is also decomposed by putting it into two iron vessels connected together by means of a pipe, and muriatic acid is added to one of them, and the gas is conveyed from one to the other, and finally steam is employed to effect this completely. There are taps for taking samples for testing, &c.

Third, "the refining the crude sulphur obtained from soda " waste by melting it under water heated in a close vessel with " pressure." The boiler should be "capable of sustaining and " working under a pressure of one and a half atmospheres," and in preference it is heated by steam. The mass in the boiler is stirred, and when the sulphur is melted it is run off by a valve into moulds.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1865, September 28.—N° 2483.

REECE, Rees.—(*Provisional protection only.*)—" Improvements " in obtaining and applying sulphurous acid, and in apparatus " used therein." These are, "separating sulphurous acid gas " from other gases" and applying it "for the purpose of refri-

" geration and congelation," using the following apparatus :—A refrigerator which " consists of two coils of leaden or other piping " one within the other, in the manner of a Liebig condenser ;" a gassifier which is " an air-tight vessel lined with lead, in which " is contained a worm of lead coiled from top to bottom as close " as possible ; each coil has a syphon connected to it to collect the " sulphurous acid condensed, which is made to irrigate the coil " below ; this vessel is to be provided with an inlet and outlet " pipe. The condenser is a coil of leaden or other piping, to " which is attached a suitable receiver ; the refrigerator and condenser are to be put into two separate vessels each containing " a frigoric mixture." " The outer coil of the refrigerator is connected to the bottom of the coil contained in the gassifier, and " the top of that coil connected with the inlet of the condenser, " the outlet of which communicates with the inner pipe of the " refrigerator. The condenser is placed over the gassifier ; the " receiver of the condenser is connected to the inlet pipe of the " gassifier through which flows the liquid sulphurous acid" over the coil, and which, converted into gas, escapes through the outlet pipe. " The mixed gases are passed through the apparatus by " any mechanical means."

" For refrigeration and congelation" by sulphurous acid, a vessel " is fitted into a leaden jacket perfectly gas-tight, having a " space between them provided with an inlet and an outlet pipe, " the inlet connected to a reservoir of liquid sulphurous acid, and " the outlet communicating with a worm and receiver contained " in a frigorific mixture " of " nitrate of ammonia and water in " equal parts, or any other well known mixture." This apparatus may be used as a gassifier.

[Printed, 4*d*. No Drawings.]

A.D. 1865, October 6.—N° 2574.

CLARK, WILLIAM.—(*A communication from Messieurs Neyret, Orioli, and Fredet.*)—" Improvements in apparatus for steeping " or treating paper pulp and other matters subjected to the action " of alkalies." These are, constructing apparatus for treating paper pulp, rags, or fabrics, as follows :—The goods to be treated are put into a closed vessel along with " barium, soda, potash, " ammonia, or other solution ;" this vessel is enclosed by a second, so as to leave a space between into which steam is introduced. " The outer casing is connected to the first-mentioned, and is

" carried in hollow bearings fitting with stuffing boxes, one of " which bearings conducts the steam from a suitable generator " into the apparatus, the other bearing being furnished with a " turbine wheel having several branches serving to raise the con- " densed water into the double casing and reconduct it to the " boiler, and so create a circulation rendering the boiler self- " feeding; for this purpose the axis of the steeping apparatus " should be above that of the boilers." The apparatus is furnished with cocks for drawing off the matters after treatment, and for " the discharge by distillation of the ammoniacal gas when such " an alkali is made use of. The whole apparatus receives continuous " rotary motion from any suitable power during the steeping " operation, which motion is arrested on the termination of the " treatment, when the distillation of the ammonia commences and " the contents of the cylinders are discharged. The inner cylinder " bears a certain number of vanes for raising, dividing, or dis- " tributing the matters so as to constantly change their position, " while the whole is enclosed with a non-conducting casing." The apparatus is charged through a man hole.

[Printed, 8*d*. Drawings.]

A.D. 1865, October 13.—Nº 2646.

BROOMAN, Richard Archibald.—(*A communication from Léandre Danjou.*)—(*Provisional protection only.*)—" An improved " liquid compound for purifying sea and other waters." This " consists of a liquid compound for purifying sea, ferruginous, " and other waters." This " compound " is made by placing 2 pounds of crystals of soda, 9 ounces of quicklime slaked and pulverized, and 8 pounds of water in a pan, and boiling them for about an hour, then removing the pan from the fire, allowing the contents to cool, and drawing off " the liquid clear." " To purify " sea water pour about nine ounces of the liquid compound into " about one hundred quarts of sea water, agitate, and allow the " mixture to settle, then draw off the clear liquid, which will be " found to be purified." " For ferruginous waters add about " seven ounces of the liquid compound to every hundred quarts " of ferruginous water." " To purify soft water add from four to " five ounces of the compound to every hundred quarts of water." " For soft waters the proportion of soda crystals in making the " compound may be considerably diminished."

[Printed, 4*d*. No Drawings.]

A.D. 1865, October 16.—N° 2660.

MOTT, ALBERT JULIUS.—" Certain improvements in the produc- " tion and uses of carbonic acid gas." These are, in reference to this subject " the employment of alum in crystals and an alkaline " carbonate in solution as materials or agents for the production " of carbonic acid gas." This is effected in an apparatus consisting " of a metallic or other vessel of any suitable external form " divided into two compartments by a partition, in which there is " an opening or communication from one to the other. The alum " crystals are placed on a perforated grid or shelf in one compart- " ment of the said vessel and the alkaline solution poured into or " formed in the other; the latter passes by the opening or com- " munication into the compartment containing the former, and as " it (the said solution) rises the materials come into contact, and " at that time evolve carbonic acid gas. As this gas cannot escape " from the vessel itself, or from the one with which it is in com- " munication, it collects and by its pressure it forces back the " alkaline solution until such time as the pressure of the said gas " is reduced by withdrawal of the same, and the force or weight " of the column of solution is in the ascendant, so as to allow " contact to take place and a new supply of carbonic acid gas to " be produced." The gas thus obtained is employed " to fill up " the spaces in casks and vessels containing and from which " fermented and other liquors are being drawn, and by so doing " to keep the liquids brisk and sweet or in a desired condition."

[Printed, 10*d*. Drawing.]

A.D. 1865, October 19.—N° 2702.

CLARK, WILLIAM.—(*A communication from Félix Dehaut.*)— " Improvements in the manufacture of chromates of ammonia and " chromic acid, and in the preparation of nitrates of lime and " baryta." These are, first, mixing intimately chromium ore with nitrate of lime or of baryta in equivalent proportions, and carefully raising " the pulverulent mass to a red heat in a reverberatory " furnace;" these nitrates being " obtained economically by the " use of acid residues from the manufacture of nitrobenzine," by acting with them upon lime, baryta, or carbonates of these bases.

Second, this is the same as the first except that the bases or *their* carbonates are substituted " for the nitrates above used, " mixed with a fusible salt of lime."

Third, "treating the chromed residues from dye works, from " electric batteries, or from the manufacture of aniline by means " of lime, baryta, or their carbonates." Mixing "the residues " together with the base of which it is desired to make the " chromate, in such a manner that the oxide of chromium con- " tained in said residues may be in proportion equivalent with the " base." This is spread thinly on the sole of a reverberatory furnace, and with stirring is kept at the appearance of redness until the oxide "is almost wholly transformed with chromic acid " and combined with the base."

Fourth, mixing hydrated oxide of chromium, however obtained, with the above bases, and raising the temperature to a dark red heat, chromates are obtained "with the greatest facility." To obtain chromate or bichromate of ammonia the chromates of lime or of baryta produced as above are treated with either the sulphate or bisulphate of ammonia. A modification of the second and third process considered "most important" is mixing "the residues of " the hydrated oxide of chromium with a half equivalent of potash " or soda (or their carbonates)," and in maintaining the tempera- " ture at a dark red heat, thus obtaining "bichromate of potash " or soda directly."

Fifth, "treating chromates of lime and of baryta obtained by the above processes in order to obtain chromic acid."

[Printed, 4*d*. No Drawings.]

A.D. 1865, October 21.—N° 2720.

BANKART, ARTHUR.—(*Provisional protection only*.)—" An " improved apparatus for calcining copper ore, and for treating " the products of copper ore when being calcined." This consists, first, in arranging the furnaces for the above purpose in a circular form, " so that by dividing the circumference into twelve " portions each fourth portion is a furnace, by which means there " are three calciners to each furnace. The calcining chambers are " placed over the flues from the furnaces, the party walls under- " neath them being perforated." The flues unite at the centre in a chimney or shaft.

Second. In reference to this subject, "the party wall between " the calciners being perforated, the hinder end of the centre cal- " ciner of each group of three is furnished with a flue, which " unites with the opposite flues in a flue connected to a retort in

" the interior of the chimney shaft. The tube of the retort is " brought out of the chimney shaft at any convenient place, and " terminates in a worm in a cistern supplied with cold water, " wherein the volatile products become condensed. Sulphuric " acid flows out of the worm at its lower end into a receptacle, " and the sulphuretted hydrogen, sulphurous acid, arsenic, and " other volatile products are led out of the worm from a point in " the last coil but one of the worm into a vessel containing oxide " of iron, where they are absorbed. When the oxide of iron is " saturated it can be removed and fresh supplied." There are also arrangements for drawing off the copper, smoke, &c. The draught may be increased by steam introduced at the bottom of the united flue from the calciners. A small pipe leads from the boiler into the worm and is furnished with a tap, so that anything accumulated in the worm can be blown out by steam.

[Printed, 4*d*. No Drawings.]

A.D. 1865, October 21.—N° 2726.

WRIGHT, James.—(*A communication from Eugene Porion.*)— " Improvements in the method of and apparatus for utilizing the " liquors used in the treatment of straw or other fibrous materials " for the manufacture of paper, which improvements are also " applicable to the evaporation of liquids generally." These are, first, "the economical recovery of the alkalies which have been " made use of" as above.

Second. "The construction, use, and application of an apparatus for evaporating and carbonizing the said alkaline and saline " liquors." For this purpose using "a vessel or chamber of convenient size and shape, the interior of which is heated by furnaces or otherwise, as most convenient, into which vessel or " chamber" "the alkaline or saline liquors to be evaporated" are conducted. In the interior of this chamber are placed "one, two, " or more spindles or shafts, furnished with fans or blades; to " these spindles a rotatory motion is given, which has the effect of " scattering the alkaline or other liquors or lyes in the form of " showers or small drops, which are quickly evaporated by the " heat within the chamber. When the whole of the liquor is " evaporated, the alkaline matters deposited can be removed from " the floor of the chamber by means of openings in the sides of " the chamber, which are furnished with doors or slides fitting

" perfectly water-tight." By these means the alkaline and saline matters are obtained, and can be re-used time after time, with the addition of "a small quantity of alkali to compensate for the " slight loss by the necessary manipulations."

[Printed, 8*d*. Drawing.]

A.D. 1865, October 23.—N° 2741.

CLARK, William. — (*A communication from Pierre Ernest Gégnon and Charles Marie Gagnage.*)—" Improvements in the " manufacture of paper from marine vegetable matters." These are said chiefly to be, first, " the primary purification of the " material by crushing and pressure, so as to extract the salts " contained in seaweed, and also the azoted organic matters which " may be used as manure, the resulting fibre being used for the " manufacture of paper."

Second. "The gradual steeping of the material, in order to " withdraw the greater part of the soda employed." The seaweeds used " by preference are those known by the names of fucus " comosus (zostera maritima), especially the varieties known as " the fucus giganteus, or fucus comosus." The marine plants may be used either dry or wet, but the latter condition will be the one in which they are commonly employed; the processes described are for the wet weeds, although dry seaweeds may be so treated " after previously steeping them in water." The weeds are crushed by means of stampers, vertical mills, or crushing rollers, either grooved or otherwise, and the pulp is pressed by a suitable hydraulic or other press, then placed in water, and again pressed. "The first and following liquors, when sufficiently rich " in saline substances, may be evaporated, in order to extract by " calcination the salts contained in the seaweed." "The pulp is " now washed in plenty of water," and steeped in a solution of carbonate of soda of a strength " of from one-fifth to one-tenth " per cent." The material is again pressed to deprive it of a greater part of the lye, which may be used again until " the " liquors are sufficiently concentrated for evaporation, in order to " extract the soda." "This evaporation may be still more eco- " nomically effected by making use of the liquids for producing " the necessary steam for heating." The material is then gradually washed, and finally so in plenty of water, is bleached.

[Printed, 4*d*. No Drawings.]

A.D. 1865, October 31.—N° 2801.

ROBINSON, George.—(*Provisional protection only.*)—" Improvements in the manufacture of caustic soda." These are, first, "a regulated and limited oxidation of the sulphide of sodium " present as an impurity in caustic soda." It is proposed "to " stop the oxidation of the sulphide of sodium as soon as it has " been changed into hyposulphite of soda, a point easily ascertained by its solution no longer blackening lead test paper," by " exposing the impure caustic soda either in the solid form, or " in solution to atmospheric air freed from carbonic acid, or by " treating it with various other oxidising agents, and" thus easily obtaining "in the form of hyposulphite of soda the sulphur " of the sulphide of sodium, which is the chief source of the " impurities ordinarily present in solutions of caustic soda."

Second. "The precipitation and removal from the impure solu" tions of caustic soda of all the more objectionable impurities." To the above oxidized solution adding "a strong solution of " caustic baryta, or chloride of barium, or nitrate or other soluble " salt of baryta, but preferably the chloride of barium, as being " the cheapest, until a precipitate is no longer formed, or in such " proportion as previous trials may have shown to be sufficient." The baryta precipitates " the hyposulphurous, sulphurous, sul" phuric, carbonic, and hydroferrocyanic acids, or any of them, " that were in the solution of caustic soda. An excess of the " precipitant must be carefully avoided;" as soon as the precipitate has settled, the clear solution is drawn off and evaporated.

Third. Utilizing the precipitate in various ways as follows:—By treating the precipitate with sulphate of soda, sulphate of baryta remains insoluble, and crystals of hyposulphite of soda are obtained on evaporating the liquid. Artificial sulphate of baryta is obtained in a form available for various useful purposes. The precipitated matters treated with muriatic acid yield sulphurous acid, as gas, chloride of barium in solution, and free sulphur as a fine powder.

[Printed, 4*d*. No Drawings.]

A.D. 1865, November 14.—N° 2934.

MALLET, Jules Théodore Anatole.—" A new or improved " process for the manufacture of oxygen." This consists in " preparing oxygen by means of the decomposition by heat of

" the oxychloride of copper, and other like oxychlorides, the solid " residue in the operation being transformed anew into oxychlo-" ride by the action of atmospheric air." "The oxichloride of " copper Cu Cl Cu O," is "obtained by various chemical means," either by " making a mixture in equivalent proportions of chloride " Cu Cl and protoxide of copper Cu O, or in treating the oxy-" chloride known by the name of Brunswick green Cu Cl^3 Cu O, " with a sufficient proportion of hydrochloric acid to bring it back " to the composition Cu Cl Cu O, or, lastly, by adding to the " Brunswick green two equivalents of chloride Cu Cl." Also taking "protochloride Cu^2 Cl, obtained by known chemical pro-" cesses, and by exposing it to the oxygen of the air," obtaining " the oxychloride required." "The primary material obtained is " mixed with from 25 to 30 per cent. of its weight of an inert " material, such as sand, pulverized fire-brick, calcined sulphate " of lime or kaolin, to prevent the said material undergoing an ig-" neous fusion." The mixture "is heated to a dark red in vessels " of any form, preferably of fire-clay, and more or less resembling " gas retorts." If the proportion of inert material is diminished, or a higher temperature employed, "the retorts should be lined " with a material proof against the action of the material under " treatment." "Compositions with a base of borate, silicate, or " phosphate of copper," are not acted upon by the chloride of copper. The oxygen evolved is passed "through a washing " vessel, which detains the steam and any chloride of copper " which may have passed out." The residue is revivified by exposure to the air, and partially so by passing a current of air through the material after it has cooled in the retort.

[Printed, *4d.* No Drawings.]

A.D. 1865, November 21.—N° 2993.

DE SINÇAY, ALEXANDRE CALLEY ST. PAUL.—" Improvements " in the manufacture of sulphur by the reduction of the sulphur-" ous acid accruing from the roasting of sulphuretted ores, and in " apparatus for the same." These are, " the manufacturing pro-" cess and apparatus, as described, for decomposing sulphurous " acid derived from the roasting of sulphuretted ores in general " and principally of blende." The sulphurous gas "from the " roasting of sulphurous ores in desulphuretting or roasting " ovens," is conveyed into a chamber below, and from the upper part of which is a pipe for conducting the gas from the chamber to a receiver, which distributes it into various reducing retorts by means of distributing pipes all grafted on the receiver; each of the reducing retorts contain "coal, coke, or other carbon material "reductive of sulphurous acid," said material being heated by a special fire underneath and sheltered against the products of combustion thereof. These retorts are in communication with sheet-iron condensers, either with or without water, and they again communicate by means of a pipe with sulphur condensing chambers disposed in a zig-zag form and made of cloth, "whereby the "sulphur is sifted and then collected and purified by any known "process. The oxide of carbon, or carbonic acid evolved, is "passed away into the atmosphere."

[Printed, 8*d*. Drawings.]

A.D. 1865, November 29.—N° 3067.

BAKER, CHARLES STUART.—(*A communication from Robert Hanham Collyer.*)—"Improvements in the process of treating "materials for the manufacture of paper and other similar textile "fabrics, and in apparatus for the same." These are, first, "the "employment of a preparatory recipient or receiver, in which "the materials are reduced in volume by the action of a strong "concentrated alkaline solution combined with hot agents." In preference, the alkaline solution "should be not less than 15° on "Beaumé's hydrometer;" "it should be used at or near the boiling state, though it may be well mixed with the material at a "much lower temperature, and afterwards brought to the boiling "state" by "steam, hot air, or fire." The reduction of the materials is conducted in a "rotating receiver or vessel of three or "four times the cubic capacity of the finishing boiler."

Second, "removing the reduced material for the completion of "the alkaline treatment from the preparatory recipient or receiver "to another vessel, and subjecting it to (by preference) high pressure steam" of "about 2 to 4 atmospheres."

Third, "the extraction of the alkaline liquor by press rollers or "with wire cloth." The material, after having been submitted to boiling under presaure, is "removed to a receiver or hopper, "and from thence to the wire band or cloth of the press rollers "so as to express the greater part of the alkaline compounds "formed." "The liquor so expressed is then evaporated and incinerated, by preference, in a reverberatory furnace, so as to "recover the alkali."

Fourth, "the combination of the apparatus and process or "apparatuses and processes."

[Printed, 8*d*. Drawing.]

A.D. 1865, December 2.—N° 3099.

BELL, Thomas.—"Improvements in treating the oxide of iron "residues of gas purifying in order principally to extract sulphur "therefrom." These are as follows:—The gas residue is washed "with weak hydrochloric acid, such as at many works is a waste "product." "A small quantity only of acid is employed for the "first washing, and this liquor, which will contain nearly all the "ammonia which was in the residue, is kept separate from the "other washings. This same liquor is used for the first washing "of different portions of waste until it becomes charged with iron "and ammonia; lime is then added, and the ammonia is distilled over and absorbed by sulphuric or other acid, or, if caustic "ammonia is required, it is condensed in water, as is well understood." The washing with acid is continued, and finally with water, and the last traces of acid are removed "by a final washing "with lime water, or the addition of a small quantity of lime. "The material is then dried, and it may, if desired, be melted and "cast into rolls in the usual way." It contains some impurities, but it is "sufficiently pure for most manufacturing purposes for "which brimstone is now employed." If a purer sulphur is required, "the material, after it has been dried and before it is "melted, is washed with naphtha or other solvent of naphthaline, "and some other impurities deposited by the gas." Strong hydrochloric acid may be used in place of weak acid, and sulphuric acid may be substituted for hydrochloric.

In the Provisional Specification the residue, it is said, from gas purifying, when dry, is placed in a retort, and the sulphur is distilled off, and in some cases the gas residue is treated "with "hydrochloric acid, which dissolves out the iron, leaving the "sulphur contaminated only with matters which are in no way "injurious in the manufacture of sulphuric acid," but nothing is said of the presence or obtaining of ammonia from this solution.

[Printed, 4*d*. No Drawings.]

A.D. 1865, December 4.—N° 3105.

HALL, Dennis.—"Improvements in the manufacture of salt, "and in machinery or apparatus for that purpose." These are, first, "a self-acting machine composed of an endless revolving " chain of buckets which lift the small coal and discharge it into " a hopper communicating with the fire-place; the fuel thus " raised is then pushed down a tube by the action of pushers on to " discs which revolve with great velocity, and thus distribute the " fuel on to the grate-bars; these said discs are moved by a " current of air acting on the fans similar to a smoke jack; the " current of air is drawn through another tube by the draft of " the chimney." "To consume the smoke two pushers and two " pair of discs are employed; the machinery for moving these " pushers is so arranged that when one pair of discs is receiving " its fuel, the other pair is not receiving any; by these means " each side of the fire is fed alternately, so that while one side of " the fire is bright the other is receiving the raw fuel, and by " these means the smoke is consumed."

Second. "Preventing the formation of pan scale on the bottoms " of salt pans," by making the salt pans in the form of two circles joined together with an upright shaft fixed in the centre of each circle, to which is attached two horizontal arms; to these arms are fixed a number of small cutters or scrapers.

Third. By processes hitherto employed of drawing or removing the salt out of the pans into flats or waggons, the salt "passes " three times through the hands of the workman," but by this method "it only passes once through his hands." To do this, " the pans should be made twice or thrice as deep as the present " pans, and would require to be drawn about once every fort" night. When the pans are full of salt, the communication with " the iron or fixed pan would be temporarily stopped; the brine " would then be let out into a lower reservoir, from whence " it would be again pumped into the pan" the salt being drained; the workman would go into the pan and throw the salt into deep hurdles with falling bottoms; railways would be made underneath them, the waggons would be loaded by simply opening the slides, doors, or falling bottoms.

[Printed, 10*d*. Drawing.]

A.D. 1865, December 4.—N° 3110.

BROOMAN, Richard Archibald.—(*A communication from Mathias Paraf-Javal.*)—(*Provisional protection only.*)—" Improve" ments in dyeing, printing, and other operations based on " chemical reactions." These are, in reference to this subject as follows:—In order to get all "the prussiate of potash contained " in a solution it is usually evaporated to crystallization, or if there " is too much water it is precipitated with an iron salt;" the time required for these operations is long, and altogether these operations are not only costly, but require "to have receivers of " dimensions out of proportion with the quantity of prussiates." To avoid these "inconveniences and expense," the iron is fixed " on a substance easily washed, as pieces of wood (wool?) or " cotton or calico." For instance, in operating with calico, the calico is put into a solution of nitrate of peroxide of iron "of " ½° to 10° Twaddle, for example," and washed directly, or before washing it is passed into an alkaline bath, "a solution of soda " crystals of ½° to 5° Twaddle." The calico thus prepared is put into the solution of the prussiate with the acid necessary to the saturation of the base, the ferrocyanic acid is fixed on the cloth, which becomes blue from Prussian blue, to convert which into the prussiate of potash, it is necessary to " treat it by potash dissolved " in the quantity of water strictly necessary to the operation, and " wash the stuff again if required." "Alkaloids, as those of opium, " strychnos (strychnine?), and others," are obtained on cloth pre- " pared by tannic, either alone or associated with bases which form " compounds more insoluble still," by manipulating it in a solution of the alkaloid, and then operating "on the calico as would " be done on the free tannate of alkaloid." The other processes have reference to obtaining colours from solutions and the application of cold in dyeing, &c.

[Printed, 4*d*. No Drawings.]

A.D. 1865, December 15.—N° 3253.

RANSFORD, Richard.—"Improvements in the manufacture " of bichloride of carbon and chloride of sulphur." These are, mixing with bisulphide of carbon "a metallic chloride or " chlorine compound," afterwards treating the mixture "with " chlorine until the bisulphide of carbon is decomposed. Bichlo- " ride of carbon and chloride of sulphur are amongst the products " obtained, the action being probably that the metallic chloride or " chlorine compound continually hands chlorine over to the " carbon and sulphur of the bisulphide of carbon." In preference employing "the anhydrous terchloride of antimony, but sesqui- " chloride of iron and terchloride of arsenic and other compounds

" also succeed well." To the bisulphide of carbon in a vessel capable of holding at least four times the quantity, one-twentieth part of its weight of solid terchloride of antimony is added, and the whole warmed to about 100° F., and then pass into the mixture dry chlorine until the precipitate which at first is formed, and immediately redissolved, becomes permanent; a condensing apparatus is connected. The product is distilled into two condensers; in the first condenser is the chloride of sulphur, and in the second the bichloride of carbon. To purify the bichloride of carbon it is distilled after having been treated with milk of lime. When working with sesquichloride of iron, employing a vessel of cast iron, by preference of a cylindrical form and several feet in length, mounted on hollow axes. This vessel is filled loosely with coarse wrought-iron filings, and then enough of bisulphide of carbon is added "to the depth of about one-third of the radius " or less." Chlorine is admitted " through one of the hollow axes, " and sesquichloride of iron is at once formed. The cylinder is " slowly rotated, and its other hollow axis should be connected " with an efficient condenser." Samples are drawn by a tap from time to time until there is a precipitate with the pentachloride of antomony; the contents are then drawn and distilled as before, and purified in the same manner.

[Printed, 4*d*. No Drawings.]

A.D. 1865, December 16.—N° 3256.

PENGILLY, CHARLES.—"Improvements in the treatment of " sulphurous and arsenical pyrites containing copper and tin." These are, in reference to this subject, "the utilization of the " volatile sulphur found in all arsenical ores in large or small " quantities." Two furnaces are arranged one above the other; the upper one in preference about ten feet long is "arranged at " the end of the lower one in such a manner that the ores treated " in the upper one may be heated by the fire from the lower one, " and so as to admit of the ores being let down into the lower " furnace at the end farthest from the fire-place. The ores as they come from the mines are introduced "into the upper " furnace, and by a mechanical contrivance they are continually " stirred without admitting any more cold air than is absolutely " necessary to sublime the volatile sulphur," until " they arrive at " the end near the fire-place, or until the whole of the arsenic is

" sublimed." "This furnace is so arranged as to contain four " charges from the upper one, each charge being in a separate " stage of the process, or provided the ores to be operated upon " do not contain sufficient sulphur materially to effect the " sublimination of the arsenic," substituting "for the two furnaces above named the ordinary rotating tin calciner," the fumes from which are passed through a hot tube some distance from the calciner, and doing "the same by the fumes passing " from the two furnaces above named."

[Printed, 4*d*. No Drawings.]

A.D. 1865, December 18.—N° 3267.

ENSELL, HENRY CAUSER. — "Improvements in smelting copper, and in obtaining products from the gases and vapours " given off during the said smelting." These are, in reference to this subject, employing "oxides of iron, preferably the peroxide, " as agents to collect products" from the smelting of copper, " such as arsenic compounds and sulphur, for which they have " an affinity. The flue from the smelting furnace leads into a " chamber of any desired shape, in which the oxides of iron are " disposed on grids or trays, and the gases and vapours given off " during the smelting are made to pass through the said trays or " grids and amongst the oxides of iron, in and by which they are " collected." The oxide of iron preferred "is known as 'bog " 'iron ore' or 'bog ochre.' The apparatus in which it is placed " for use may be provided with valves and compartments in the " same manner as purifiers used in gasworks." "Coke towers " and jets of water to lower the temperature, of the well-known " kind, could be used alongside the chamber containing the oxides " of iron." The smelting of the copper has reference also to the application for the purpose of gaseous fuel.

[Printed, 8*d*. Drawing.]

A.D. 1865, December 26.—N° 3340.

HENRY, MICHAEL.—(*A communication from Alphonse Laurent.*) —(*Provisional protection only.*)—"Improvements in the manufacture of soda, and in the apparatus employed in the said manu" facture." These are, causing superheated steam to decompose chloride of sodium by acting upon it "on all parts" "when in a " fluid, molten, or semi-fluid state," and obtaining soda. One mode is to project the steam into the mass of the chloride so that it permeates it in bubbles. "The steam may be forced in from " the top, the bottom, or the sides." "The chloride may be " placed in a vessel in the furnace, and the steam introduced " through pipes leading into the bottom of the vessel." "In " another arrangement retorts with bent necks are used instead " of a furnace." "Another process consists in presenting the " chloride in thin films or streams to the action of numerous jets " of steam."

A furnace for the purpose may be constructed thus:—"An " arch extending the whole length of the furnace divides it into " two chambers; the lower has the fire-box at one end, and leads " at the other end into a chimney, it is intended for the fire and " products of combustion, and it may be fitted with plates, ledges, " or contrivances to deflect the heat and give additional heating " surface. The upper chamber is intended to receive the chloride " of sodium and the steam; it contains a number of ledges or " steps having notched, slotted, or indented edges; these steps " are formed on the sides of the arch, and superheated steam " pipes open opposite the parts of the arch between the steps." The chloride is introduced on to the top of the arch, and from thence "it falls on to and spreads over the steps, and descends " from one to another to the bottom of the chamber, being " meanwhile subjected to the action of the steam. The soda is " carried off through a delivery passage, and the products of combustion pass into the chimney."

[Printed, 4*d*. No Drawings.]

1866.

A.D. 1866, January 10.—N° 85. (* *)

BROOMAN, Richard Archibald.—(*A communication from Charles Raphael Maréchal and Cyprien Marie Tessié du Motay.*) —"An improved method of producing oxygen." It is stated that manganates, per-manganates, ferrates, and chromates of potassa, soda, and baryta, and "in general all metallic oxides or acids " which will form with potassa, soda, and baryta binary combi" nations capable of superoxidizing, possess the property of

" yielding their oxygen at a more or less elevated temperature " when they are submitted to the action of a current of steam. " These bodies thus deoxidized also possess the property of becoming reoxidized when they are exposed to the action of a " current of air at a temperature more or less great."

This invention consists, " in the direct production of oxygen " by means of atmospheric gas," and " is based upon the double " property just cited." One of the above binary compounds is placed in a retort or distillatory vessel, whether at its minimum or or maximum state of oxidation; if it is at its minimum it is superoxidized by means of a current of air drawn or impelled over it. If the compound is at its maximum state of oxidation it is deoxidized " by means of a current of steam or by injecting water. " The oxygen and steam on issuing from the retort pass together " into a condenser; the steam is condensed and the oxygen passes " on to a gas holder in which it is collected. When all the " utilizable oxygen contained in the binary compound has been " disengaged by the action of the steam the operation of superoxidation by means of air is recommenced and vice versâ."

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 10.—N° 86.

CHETWYND, George.—(*A communication from Viscount Charles de Secqueville.*)—(*Provisional protection only.*)—" Improvements " in the treatment of copper and nickel ores." These are, in reference to this subject, as follows :—" The ground ore, or the schlick " thereof," is mixed " with about five per cent." of the " residuum " of the manufacture of nitric or azotic acid," the flue of the " furnace or oven being put in communication with a tower or " shaft about 8 yards high, and filled up with coke," so as with water to condense the acid vapours. The ore or mineral when roasted as above is reduced to small pieces by rollers or other crushing apparatus mixed with a proportion equal to about fifteen per cent. of equal parts of a mixture of common sea salt, binoxide of manganese, and of the residuum of the manufacture of nitric acid. After the second roasting the materials in heaps are sprinkled daily for a week with the acid waters coming from the tower, and the whole washed by decantation. The free gold " is precipitated under the action of the dissolved salts of iron, " provided, however, the ore be auriferous. The copper is after-

" wards precipitated from its solution by means of granulated pig " iron." The remaining solutions are concentrated, and the green vitriol or sulphate of iron crystallized out. " The mother " waters may be used again to sprinkle over the above-mentioned " heaps of calcined or roasted ore." The remainder of the Specification relates to the obtaining of the metals.

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 11.—N° 97.

CRUMP, Charles. — " Improvements in the preparation of " tetrachloride of carbon." These are, preparing it " by the " action of chloride of iodine or bromine or of chlorine in the " presence of iodine or bromine dissolved in bisulphide of car" bon " as follows:—Iodine is dissolved in bisulphide of carbon in a retort kept cool by water or otherwise, and dry chlorine gas is passed into the solution to saturation, " or until crystals of " chloride of iodine appear." " The compound thus formed " consists of a mixture of tetrachloride of carbon and chloride of " sulphur," which is digested " with excess of sulphur in order " to convert the higher chlorides of sulphur which are present " into protochloride. The tetrachloride of carbon is afterwards " partially separated by distillation, and the distillate purified by " treatment with water or milk of lime, or potash ley, or in any " other suitable manner." " In some cases, especially where a " sufficient amount of chlorine has not been passed into the " solution of iodine in the bisulphide of carbon, as before " mentioned, it may be necessary after purifying the tetra" chloride of carbon to complete the purification by dissolving in " it a fresh quantity of iodine and passing in a small additional " quantity of chlorine. A very small quantity of iodine is suffi" cient to effect the decomposition of an unlimited amount of " bisulphide of carbon."

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 12.—N° 101.

SUTTON, Francis.—(*Provisional protection only.*)—" Improve" ments in the treatment of sewage and urine in order to recover " the manurial constituents therefrom." These are, adding to the sewage in tanks " sulphate of alumina " from " three to ten " grains per gallon of sewage either used alone or in conjunction

" with common clay, fuller's earth, burnt clay, bog ochre, sul-" phate of magnesia, or peroxide of iron, these substances being " used in proportion according to the state of concentration in " which the sewage exists." In a short time the clear liquid is run from the precipitate and used for the purposes of irrigation, or in order to extract ammonia, in which case it is "run into " large tanks or pits having covers or other means of being closed " tolerably tight, and fresh caustic lime added either in a slaked " or unslaked condition in the proportion of about one pound to " every hundred gallons of diluted sewage, and in larger propor-" tion if the sewage or urine is in a concentrated state." Shallow trays are suspended over the surface of the mixed sewage and lime, containing sulphuric acid or hydrochloric acid, either alone or mixed with a number of absorbent materials named. Fermentation is set up in a short time, and the ammonia evolved "is im-" mediately absorbed by the acid or acid mixture in the trays" to saturation.

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 13.—N° 121.

TODD, Brereton.—" Improvements in the manufacture of " arsenic." These are, " in roasting the arsenical ore and " revolatilizing the arsenious acid in a furnace heated by the " combustion of a combustible gas generated from coal or coke " in a furnace, kiln, or retort so situated that any grit or dust " may be separated or deposited, and the free carbon consumed " or washed out before entering the condensers with the arsenious " acid." The ores are roasted, or the arsenic is revolatilized in a furnace or furnaces, such as are in general use in connection with condensers, preferring them " from 30 to 40 feet in length; but " instead of heating such furnace or furnaces by the combustion " of coal or coke in a fire-place attached to the furnace," heating " it by a clear flame obtained by the admission and combustion " of carbonic oxide gas and atmospheric air." The gas is introduced into the furnace through a pipe or pipes at the end or sides of the furnace, preferring " it in a single jet at the end " where the fire-place is generally situated;" hydrogen gas may be used in place of carbonic oxide. For separating dust and grit from the gases, they may be passed through a tower with coke and water. Should the substance contain sulphur, the sulphurous

the pans now in use, and in place o
about 12 inches deep, and the wid
pans as are required, through wh
flows.

[Printed, 8*d*. Drawing.]

A.D. 1866, Januar

PENNEY, Charles Gregory.—
—“ Improvements in the treatme
“ waste products resulting from
“ cannel, and other coals and mine
“ China clay and other analogou
reference to this subject, as follows :
from the above substances, also
“ mineral,” also from bituminous
“ partially or entirely waste or use
burned so as to get rid of the ca
“ may be digested, boiled, or heate
“ or other mineral acid, or in acetic
“ any suitable mixture of such ac
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rated, “ will constitute sulphate of
“ solution may be converted into c
“ potassic or ammoniacal salts, and
“ known methods. If hydrochloric

" silica from China clay, and other substances of an analogous " character, can also be utilized by adopting the above-mentioned " processes."

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 30.—Nº 290.

LYCETT, William.—(*Provisional protection refused.*)—" Improvements in the manufacture of salt." These are, " in the " employment and utilization of what is known as the waste " heat," " produced by the mixed gases which escape from blast, " puddling, and other furnaces employed in the production of " iron," for " heating and evaporating saline solutions in order to " obtain the salt or chloride of sodium contained therein." The gases are collected and conducted " under evaporating pans, or " other heating apparatus or arrangements," and the fire-place or chamber is so constructed that air may be admitted to burn the waste gases. "The construction of the fire-place, and the burners " necessary for effecting the combustion of waste gases from iron " furnaces, is well understood."

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 31.—Nº 301.

DELAFIELD, Clarence.—" Improvements in the manufacture " of saltpetre and white lead." These are said to be, first, " uniting and combining a solution of the nitrate of lead (or its " equivalent for this purpose)," made with from 112 to 124 parts of nitric acid of commerce of about 36° Baumé, and 112 parts oxide of lead, and water, sufficient to make a saturated solution of nitrate, and with a solution of 70 parts of purified carbonate of potash, " for the purpose of producing the white lead of com- " merce."

Second. Uniting and combining hot solutions (about 200° F.) of carbonate of potash and of nitrate of lead (or their equivalents for this purpose) for " the purpose of producing the white lead " of commerce."

Third. " The application of a jet of steam to a solution of the " nitrate of lead, or to a solution of the carbonate of potash (or " their equivalents for the purpose)," or to their combined solution, " for the purpose of aiding in the production of the white " lead of commerce."

acid evolved is drawn through the condenser in which the arsenious acid is condensed, and washed by passing through a shower of water, or water saturated with sulphurous acid, and into a leaden chamber to be converted " into sulphuric acid by " the well-known means." Nothing is said of this part of the process in the Provisional Specification.

To manufacture arsenious acid into lump arsenic, employing the pans now in use, and in place of the fire-places, placing a flue about 12 inches deep, and the width of the pans, under as many pans as are required, through which a stream of burning gas flows.

[Printed, 8*d*. Drawing.]

A.D. 1866, January 22.—N° 200.

PENNEY, CHARLES GREGORY.—(*Provisional protection only.*) —" Improvements in the treatment and utilization of certain " waste products resulting from the combustion of boghead, " cannel, and other coals and minerals, and from the treatment of " China clay and other analogous substances." These are, in reference to this subject, as follows :—Utilizing the coke and ash from the above substances, also from " Torbane hill coal or " mineral," also from bituminous shale and minerals " hitherto " partially or entirely waste or useless products." The coke is burned so as to get rid of the carbon, and the ash remaining " may be digested, boiled, or heated in sulphuric, hydrochloric, " or other mineral acid, or in acetic or any analogous acid, or in " any suitable mixture of such acids." If sulphuric acid was used, a solution of sulphate of alumina is obtained, which evaporated, " will constitute sulphate of alumina or cake alum, or the " solution may be converted into common alum by mixture with " potassic or ammoniacal salts, and then concentrated by the well-" known methods. If hydrochloric acid be used, the result will " be chloride of alumina, and if acetic acid be employed, acetate " of alumina will be produced." The insoluble residue from the above treatment, which is said to be pure silica, " can be used " with particular advantage for the manufacture of silicate of " soda or potass," the usual method of manufacture being employed. " If it be preferred, silicates or aluminates of alkalies " may be prepared by furnacing the coke in the first instance with " the alkali, without first removing the carbon." " The refuse

" silica from China clay, and other substances of an analogous " character, can also be utilized by adopting the above-mentioned " processes."

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 30.—N° 290.

LYCETT, William.—(*Provisional protection refused.*)—" Im-" provements in the manufacture of salt." These are, " in the " employment and utilization of what is known as the waste " heat," " produced by the mixed gases which escape from blast, " puddling, and other furnaces employed in the production of " iron," for " heating and evaporating saline solutions in order to " obtain the salt or chloride of sodium contained therein." The gases are collected and conducted " under evaporating pans, or " other heating apparatus or arrangements," and the fire-place or chamber is so constructed that air may be admitted to burn the waste gases. "The construction of the fire-place, and the burners " necessary for effecting the combustion of waste gases from iron " furnaces, is well understood."

[Printed, 4*d*. No Drawings.]

A.D. 1866, January 31.—N° 301.

DELAFIELD, Clarence.—" Improvements in the manufacture " of saltpetre and white lead." These are said to be, first, " uniting and combining a solution of the nitrate of lead (or its " equivalent for this purpose)," made with from 112 to 124 parts of nitric acid of commerce of about 36° Baumé, and 112 parts oxide of lead, and water, sufficient to make a saturated solution of nitrate, and with a solution of 70 parts of purified carbonate of potash, " for the purpose of producing the white lead of com-" merce."

Second. Uniting and combining hot solutions (about 200° F.) of carbonate of potash and of nitrate of lead (or their equivalents for this purpose) for " the purpose of producing the white lead " of commerce."

Third. " The application of a jet of steam to a solution of the " nitrate of lead, or to a solution of the carbonate of potash (or " their equivalents for the purpose)," or to their combined solution, " for the purpose of aiding in the production of the white " lead of commerce."

" nace connected with the coke tower ordinarily used for the con- " densation of hydrochloric acid," hydrochloric acid is evolved and collected, " sulphate of sodium mixed with magnesia remain- " ing behind." The sulphate of sodium washed from the magnesia is " decomposed hydrofluoric acid, fluoride of sodium being " thereby produced and sulphuric acid set free. The fluoride of " sodium thus formed is boiled with the magnesia obtained" above, " and the results are, a solution of caustic soda and " a precipitate of fluoride of magnesium. The fluoride of " magnesium is finally decomposed by means of the sulphuric " acid set free in the third operation of the process, with the " production of sulphate of magnesium for use over again in the " first operation of the process, and hydrofluoric acid for use over " again in the third operation."

" A shorter method of proceeding consists in decomposing by hy- " drofluoric acid chloride instead of sulphate of sodium, in then " decomposing the resulting fluoride of sodium by ebullition with " magnesia, and in finally decomposing the fluoride thus obtained " by sulphuric acid." The fluoride of sodium may be decomposed by lime or its carbonate, and also by steam and the hydrofluoric vapour condensed. Sulphate of magnesia heated with charcoal; sulphurous acid is evolved and converted into sulphuric acid in a leaden chamber, and magnesia remains, both used in the above decompositions.

[Printed, 10*d*. No Drawings.]

A.D. 1866, March 1.—N° 629.

WELDON, WALTER—(*Provisional protection only.*)—" Improve- " ments in the manufacture of soda from common salt." These are, in place of decomposing chloride of sodium by sulphuric acid, using oxalic acid and decomposing "the resulting oxalate of " sodium with either the oxide, hydrate, or carbonate of calcium," or of other metal which forms with oxalic acid a compound sufficiently insoluble in water, when boiled or otherwise, to separate the oxalic acid from the oxalate of sodium. The oxalic acid is finally recovered from this oxalate by treating it with sulphuric acid or any other suitable reagent. It is said that " when this " process is conducted with sufficient care, the loss of oxalic acid " is so minute as to permit of soda being obtained by this process " much more economically than by the method at present in use."

[Printed, 4*d*. No Drawings.]

A.D. 1866, March 5.—N° 660.

PLAYER, JACOB HORT.—(*Provisional protection only.*)—" An " improvement or improvements in the manufacture of phos- " phorus." This consists in decomposing phosphoric acid or acid phosphate of lime by means of carbonaceous matter and heat, as follows:—Take the crude solution of phosphoric acid from bone ash, mineral phosphates, coprolites, &c. obtained by means of sulphuric acid, evaporate the solution to the consistence of a dense liquor or paste, and mix it with spent tan, sawdust, peat, or other ligneous matter, and heat the mixture in a furnace; or when it is desired " to collect volatile products of the decomposition of " the ligneous matter," the mixture is heated in a retort or other vessel of iron or other metal to a temperature sufficiently high to thoroughly decompose or carbonize the ligneous matter, and " after having effected the carbonization of the ligneous matter, " and driven off all the volatile compounds," " the resulting " black powder or granular mixture " is " introduced into retorts " such as are commonly employed for the distillation of phos- " phorus," and the phosphorus is distilled from them in the usual manner.

[Printed 4*d*. No Drawings.]

A.D. 1866, March 7.—N° 690.

DAVIS, HENRY FRANCIS.—(*Provisional protection only.*)—" A " new chemical process for manufacturing artificial tea." This consists as follows:—First, " decompose bichromate of potash " with concentrated sulphuric acid by means of baryta, or other- " wise ;" " next add two equivalents of pure chromic acid and " one equivalent of ammonia; the solution is next evaporated " and the salt subsequently separated. The salt thus obtained is " pure bichromate of ammonia, and when ignited at a low red " heat in a metal dish over the flame of a candle or a jet of gas, it " continues to burn and every particle of the salt is decomposed, " and the residuum forms an exact resemblance to tea." In carrying out the above, " take 4 parts by measure of cold saturated " solution of bichromate of potash, then add 5 parts by measure " of concentrated sulphuric acid, separate the chromic acid and " semi-saturate with solution of ammonia, evaporate and crystal- " lize the ammonia."

[Printed, 4*d*. No Drawings.]

A.D. 1866, March 12.—N° 747.

SEVERN, George.—(*Provisional protection only.*)—"Improvements in the means and apparatus employed for evaporating "and cooling liquids applicable to various purposes." These are, in reference to this subject, "in evaporating liquids for the concentration of saline solutions, or for other similar purposes," placing "a cover over the evaporating pan or vessel, leaving a "narrow space between the under side of the cover and the upper "surface of the liquid." In preference "the cover should be "capable of adjustment in order to vary and regulate the distance "it is placed above the surface of the liquid. One end or side of "the cover and space below is left open, or, by preference, is "placed in communication with the outer atmosphere, the opposite end or side of the cover and space below being connected "with an air pipe or passage, the other end of which passes into "the closed ashpit or other suitable part of the fire-place or "furnace of the evaporating pan, or of a steam boiler." To accelerate the process of cooling liquids according to this invention, "the vats or cooling vessels have covers capable of adjustment placed over them, so as to leave a narrow space between "the under side of the cover and the surface of the liquid to be "cooled. One end of such space is left open, or is placed in "communication with the outer atmosphere, the other end of "such space being connected with a pipe or passage leading to "the closed ashpit or other suitable part of a fire-place or furnace "(by preference that of a steam-boiler)." The air passage from an evaporating pan or from a cooling vat may be formed with branch pipes or passages communicating with several fire-places or furnaces if desired." The remainder of the Specification refers to the cooling of worts or liquids in breweries or distilleries.

[Printed, 4*d*. No Drawings.]

A.D. 1866, March 13.—N° 753.

DEANE, William Francis.—(*Provisional protection only.*)—"Certain improvements in the treatment and utilization of the "residual liquor arising from the production of chlorine gas." These are, treating roasted iron pyrites containing copper with the above liquor. This solution is treated with metallic iron in plates or rods to precipitate the copper, and "the liquor thus freed from "copper may now be neutralized with carbonate of lime or other

" alkaline earth; the remaining metals in the neutralized liquid " may then be either precipitated with milk of lime, and either the " whole or a portion of the iron may be separated first from the " manganese by contact with the carbonate of lime or other car- " bonated alkaline earths, and the manganese still in solution " may be precipitated and again treated by any well-known " process for the production of chlorine." If desired, before separating the copper the liquid may be treated with "carbonate " of lime, by which process the manganese remains in solution as " chloride, and the metals of iron and copper are precipitated as " carbonates, to be afterwards brought into solution by an acid, " from which the copper is extracted by immersion of iron plates " or rods;" or the copper may be obtained "in the form of sul- " phuret by treatment with an alkaline sulphuret or sulphuretted " hydrogen, which last result is oxidized and brought into the " form of sulphate of copper."

[Printed, 4*d*. No Drawings.]

A.D. 1866, March 19.—N° 812.

ROUTLEDGE, Thomas, RICHARDSON, Thomas, and RICHARDSON, William Henry.—" Improvements in treat- " ing the waste liquors resulting from the preparation of esparto " grass, alfa, straw, and other fibrous substances, and in purifying " the alkali recovered thereform, and in furnaces or evaporating " pans connected therewith." These are as follows:—These liquors are run while hot, when practicable, into reservoirs or pans, and evaporated in a reverberatory or other furnace, so as to burn off the organic matter wholly or in part. The red hot mass is drawn from the furnace and exposed to the air, and if carbon is still present, it may be further heated "in a carbonating furnace " until all or nearly all the carbon is consumed and a 'white ash' " obtained." Or, instead of proceeding as above, the organic matter in the mass is merely charred, and thus rendered insoluble in water, and the residue digested in water, and the solution boiled down to dryness or mixed with lime for subsequent treatment herein-after described. The ashes thus obtained are mixed with quicklime, ground together, heated in a furnace until a portion or all the acids from the soda salts are evolved, or the ash is dissolved in water and the lime slacked with this solution. The resulting materials are lixiviated with water, and the liquor so obtained can be employed. These operations are conducted in ordinary pans and furnaces, or in a furnace consisting "of two "beds separated by a bridge, the one nearest the fire being "devoted to the treatment of the materials with lime when necessary, while the other is used for burning off the organic matter." The bridges are all made hollow, with openings to admit air. At the end of the furnace is a pan, built so as to allow the products of combustion from the fire-grates and from the burning of the organic matter to pass over the liquor with which it is filled. Above this pan an iron pan is erected, and the combustion products pass beneath it through a flue and thence over the liquor in it. Above this again may be placed a third pan or reservoir, into which the waste liquors may be run.

[Printed, 4*d*. No Drawings.]

A.D. 1866, March 23.—N° 863.

AMOS, CHARLES EDWARDS, and ANDERSON, WILLIAM.—"An improved mode of treating waste liquors for the dissipating "or utilizing the same." This consists in discharging such liquors on to burning fuel contained in an open or closed furnace, as follows:—Employing an arrangement of furnace similar to a blast furnace, either closed or open at top. This furnace is charged with coke or other fuel, and having fired up the furnace, the liquor is admitted on to the top of the fuel, keeping up a supply of air by means of tuyers as long as the discharge of liquor on to the burning fuel is continued. The alkali will gradually collect at the bottom of the furnace, and may be drawn off from time to time. If the furnace be open at the top the vapour and gases will pass off into the atmosphere and be dissipated, but by closing the top of the furnace, and connecting a pipe to the said cover, the heated vapours and gases may be led off and made use of for obtaining motive power or for drying, or for heating purposes. "When "using coke as a fuel for evaporating black liquor from straw "boiling" "the residuum is chiefly a sulphate of soda," but in order to obtain the carbonate which is the material employed in the process of boiling the straw, it is proposed "to add to the "black or waste liquor, before admitting it to the furnace, chalk "or whiting, in proportion equivalent to the strength of the "alkaline liquor; a residuum of carbonate of soda will thus be "obtained."

[Printed, 8*d*. Drawing.]

A.D. 1866, March 29.—Nº 915.

MARTIN, John Cowdery.—"An improvement in treating "bones, and in the manufacture of the products thereof." This is said to consist "in the separation or precipitation of the lime by "means of sulphuric acid from the solutions of muriatic acid and "from the solutions of muriatic and phosphoric acid, and the "manufacture of gelatine and superphosphate of lime from the "bones," treated as follows:—Muriatic acid diluted with water is poured upon bones, boiled or cleaned as free from extraneous matter as possible, broken in small pieces, and allowed to remain for about forty-eight hours till as nearly saturated as possible; the solution is run off "into a separate vessel and treated with as "much sulphuric acid as will convert the whole of the lime or "nearly so held in solution into sulphate of lime, which produces "a bulky precipitate;" this is separated from the solution by filtering through woollen cloths. The solution is practically muriatic and phosphoric acids, and is ready to act on bones, and as the process is repeated with it upon successive quantities of bone, and each time the precipitated sulphate of lime is filtered from it, the quantity of phosphoric acid in solution becomes greater and more concentrated. "Some muriatic acid and a large quantity of "phosphoric acid is left entangled with the sulphate so filtered;" it "is superphosphate of lime, and is valuable as a concentrated "manure." To keep up the activity of the solution it is necessary to add to it "the water and an equivalent of the quantity of "muriatic acid taken from it; the phosphoric acid is furnished "to it by the succeeding quantity of bones." The cartilage thoroughly washed may be made into glue, gelatine, &c. The filtrate requires "about five per cent." of its weight of lime in drying it, and to form "with the free phosphoric acid soluble phos"phate of lime." In the Provisional Specification it is stated that "from the phosphoric acid so produced phosphates and phos"phorus may be obtained in the usual manner," but nothing is said of this in the Complete Specification.

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 7.—Nº 1002.

MUSPRATT, Edmund Knowles.—(*Provisional protection only.*)—"Improvements in burning or calcining and preparing for "burning or calcining copper, iron, and other ores containing "sulphur for the manufacture of sulphuric acid." These improvements are "more generally applicable to those substances "when in a fine or powdered state, that is to say, to those ores "which are commonly known as pyrites 'fine' or 'smalls.'" Hitherto two methods "have been generally practised, that is to "say, burning them on plates or shelves," or by binding or cementing the fine pyrites with clay, forming this mixture into balls, and burning them in an ordinary pyrites kiln. "This invention consists in substituting for the clay the refuse oxide of "iron which has been used in the purification of coal gas, and "which possesses all the binding or cementing powers of ordinary "clay, but which instead of being deleterious and retarding the "production of the sulphuric acid is on the contrary beneficial, "and greatly aids the production of the said acid."

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 9.—N° 1009. (* *)

WEATHERDON, BALDWIN FULFORD.—(*A communication from Jeane Pierre Caminade.*)—"Improvements in treating lucern root "for paper-making and weaving purposes, as well as in abstracting "soda salts and coloring matters therefrom."

According to this invention the roots of the lucern plant are crushed between rollers in order to expel the sap therefrom, and are then dried, and are next "submitted to any retting or macerating process in like manner to hemp and flax, for the purpose "of disintegrating heterogenous substances," the fibrous parts thus obtained being then bleached in the usual way and used for spinning, weaving, and paper-making purposes.

Soda salts or kelp, picric acid, and "a new coloring matter called "luzerine, from which green and yellow colours are produced," are obtained "by treating the said roots and setting them in "boiling water heated by steam," and "successively evaporating "the washing waters."

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 9.—N° 1016.

HOFMANN, PANAJOTA WILHELM.—(*Provisional protection only.*)—"Improvements in separating sulphur from soda waste." These are as follows:—The soda waste is taken directly from the soda liviviating vessels, and if it does not contain chalk a small quantity should be added, and the whole then spread out on a large floor and moistened with a solution of chloride of manganese, and turned over with a shovel from time to time to facilitate the admission of air, and frequently sprinkled with water. The liquors thus obtained, "called yellow leys, are drawn off into a " large and very deep pit, and then treated with an acid solution " of chloride of manganese introduced at the bottom of the pit; " this acid solution of manganese is such as is obtained in the " manufacture of bleaching powder, and by employing it in this " way the acid which it contains is utilized. The acid liquor is " added until sulphuretted hydrogen begins to be evolved; or " hydrochloric or other acid may be employed. The precipitated " sulphur is allowed to deposit slowly, the supernatant liquid " drawn off; the sulphur washed repeatedly with the acid solution " of chloride of manganese or with hydrochloric or other acid, " then introduced into a steam boiler containing some of the " above-mentioned yellow leys, and therein fused under pressure; " the fused sulphur can then be drawn off through a stop-cock. " Or the sulphur may be melted without pressure in a solution of " chloride of calcium or any other suitable salt."

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 9.—Nº 1017.

DAVIES, George.—(*A communication from Amédée Francois Rémond.*)—(*Provisional protection only.*)—" Improvements in the " process of desulphuration and in the apparatus employed for " such process." These are, in desulphurating liquids, such as the sulphide of sodium, sulphide of barium, or others, to obtain them caustic, in using a metallic oxide and desulphurating the metallic sulphuret formed. The liquid is agitated with the oxide, say the oxide of copper, until in a short time desulphuration of the liquid takes place, ascertained by known reagents or tests; the liquid is drawn off from the precipitated metallic sulphide, and the vessel containing the sulphide is placed over a furnace to be dried; "beneath this is a reverberatory furnace or desulphurating " chamber, furnished with an aperture above the pan, through " which the sulphide is to be introduced, and which when the " furnace is in action is closed with a fire-brick stopper. This " furnace is provided with a fire-place and damper, and also an " opening for admitting atmospheric air when required. In the

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" centre of the pan of the furnace is a valve leading to a passage " which (when the valve is opened) conducts the oxide on to a " pair of crushing rollers placed below for the purpose of reducing " the oxide to powder; below these rollers is placed the metallic " vessel into which the oxide falls, and into which is also intro- " duced the liquid to be desulphurated. This vessel is mounted " upon gudgeons or trunnions upon a carriage, so that it can be " rocked or agitated;" near the bottom is a pipe and stop-cock for drawing off the clear liquid; the carriage runs on a railway; a crane is provided for the purpose of raising the vessel from the carriage and placing it over the furnace to dry the sulphuret.

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 13.—N° 1049.

SWAN, ALEXANDER.—" Improvements in apparatus for evapo- " rating or recovering lees." These are, first, " in the combina- " tion of a close evaporating vessel and of an open evaporating " pan," as follows:—Upon the top of the close vessel is placed or constructed " an open pan, the lower part of which is shaped to " correspond with the top of the close vessel, so that the heat " given off from the close vessel may heat the open pan and " evaporate the contents thereof." It is preferred " to carry a " pipe from the upper part of the close vessel, which pipe is bent " round and carried over the open pan and terminates in an open " cistern, from the lower part of which another pipe leads down " into the close vessel; thus the lees and the steam which pass " from the close vessel are conducted by the first-named pipe to " the cistern, where they become separated, the lees descending " by the second-named pipe back into the close vessel, while the " steam is allowed to escape. The open pan is supplied from the " first-named pipe, or otherwise, as required."

Second, " in an arrangement for feeding the close vessel." Employing " above the level of the close vessel a cistern in com- " munication by a pipe with a reservoir containing the lees." Fitting " a ball cock in the cistern, which closes the communica- " tion with the reservoir when the cistern is sufficiently full, " and vice versâ. A second pipe leads from the cistern to the " close vessel."

[Printed, 8*d*. Drawing.]

A.D. 1866, April 19.—N° 1098.

OLDHAM, WILLIAM, PENN, HENRY, and EADES, CHARLES.—(*Provisional protection only.*)—"Improvements in collecting or "condensing and utilizing the fumes given off by furnaces used "in the manufacture of copper, and in other metallurgical operations, which improvements may also be applied to the collecting "or condensing of fumes from other sources." These are, "constructing in the flue through which the fumes to be collected "or condensed pass a chamber containing a wheel with vanes "having a scoop-like form, and when the wheel is made to rotate "rapidly its lower side dipping in water or other liquid, the said "liquid is thrown or splashed about the chamber and divided into "a spray," and condenses any matter which is soluble. In furnaces used in the manufacture of copper water is employed, which condenses the sulphurous acid which may be "drawn off "from time to time and utilized by being saturated with a base "and thereby converted into a sulphite of the base employed; or "the sulphurous acid obtained may be applied to any other purpose for which it is applicable." "In collecting the oxide of "zinc produced in melting alloys of zinc, and in other processes "where zinc is melted," in place of water, hydrochloric or dilute sulphuric acid may be used, which dissolves the oxide of zinc and a solution of chloride and sulphate of zinc is obtained, and may be evaporated and "used in the form of zinc salt, or the said salt "may be reduced and metallic zinc obtained therefrom. In place "of or in addition to the wheel, steam may be passed into the "chamber to assist the condensation of the oxide of zinc fumes. "Where acids are employed the wheel is made" of a material not acted upon by the acid employed. The wheel is driven by a steam engine or other convenient motive power. The mode of collecting other fumes does not differ essentially from the above.

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 20.—N° 1108.

LUNGE, GEORGE.—"Improvements in the manufacture of car"bonates and bicarbonates of soda and potash." These are said to be, first, "the conversion of the sulphates of soda and potash "into the bicarbonates of those bases by conducting a stream of "carbonic acid through a mixture of a solution of the sulphates "and carbonate of barytes," kept "in constant agitation until "the conversion of sulphate of soda into bicarbonate is completed "or nearly so." It is preferred to use artificial carbonate of barytes. In the Provisional Specification there is nothing said of passing a stream of carbonic acid into the solution of sulphate of soda in which the carbonate of baryta is suspended, but merely agitating the sulphate and carbonate together.

Second. The treatment of the solutions of bicarbonates of soda and potash obtained as above, so as to yield either solid bicarbonates, or crystals, or ash, as follows:—When the sulphates of soda or potash are converted into bicarbonates with a little monocarbonate, the contents of the vessel are "run into a 'settler,' where "the precipitate can settle down." The liquid is drawn off into the evaporating pan, and to obtain bicarbonate of soda the evaporation must be slow and at a temperature not exceeding 150° F., until it yields a crop of salt on cooling. If the salt is deficient in carbonic acid this gas may be passed into it, or the gas may be transmitted through the solution during the evaporating process. The bicarbonate may be obtained purer by washing with a little cold water. Crystals of soda or ash are obtained as the liquid is manipulated more or less rapidly. The precipitate referred to above is principally sulphate of barytes with a little carbonate if carbonate was in excess of the sulphate used.

Third. "The recovery of the carbonate of barytes from the "sulphate of barytes" for the purposes of this invention, as follows:—The sulphate of barytes, native or otherwise, in fine powder is mixed with a carbonaceous matter, as coal, either with or without tar, oil, &c., and reduced to sulphide in a reverberatory furnace, and the mass lixiviated with warm water and the solution exposed to the action of carbonic acid; this is effected in an agitator or condensing tower, or by exposing the solid sulphide of barium in a damp state, with or without the introduction of steam, to the action of carbonic acid, but decomposing a solution of the sulphide is preferred; sulphuretted hydrogen in any case is evolved.

Fourth. "The absorption or decomposition of sulphuretted "hydrogen" as above, as follows:—Burnt pyrites exposed to moisture and air, "the sesquioxide of iron is gradually hydrated" and crumbles to powder; this may be used in purifiers for absorbing the sulphuretted hydrogen, and the material repeatedly used over again after being exposed to the air, until it is saturated with sulphur when it is burnt, and "the sulphurous acid evolved may

" be utilized in lead chambers for the manufacture of sulphuric " acid." Another method is to mix chalk and "still liquor," or " chlorine residue," and bring the gas into contact with this mixture kept in constant agitation, sulphides of manganese and iron will be formed. The carbonic acid evolved may be employed in the first stage of the process. Another plan is to have streams of this last mixture trickling down a tower while the gas is passing upwards. The spent mixture when allowed to settle and the liquid drained off, the residue " the sulphides of manganese and " iron " is roasted, and the sulphurous acid evolved " may be em- " ployed as commonly done in lead chambers." After roasting as above sulphate of manganese remains, which may be used in the place of the "still liquor." Perchloride of iron may be employed instead of the " still liquor."

Fifth. " The renewed employment of the carbonic acid given off " in the aforesaid various processes."

[Printed, 6*d*. No Drawings.]

A.D. 1866, April 25.—N° 1163.

NOONE, George Edward.—" Improvements in machinery and " processes for deodorizing and treating sewage and other refuse, " and manufacturing therefrom manure and other substances for " chemical and other uses." These are, in reference to this subject, as follows:—A tank is placed "at or near the outfall of the " sewer divided into compartments with percolating partitions " and sluices to open and shut at pleasure. One of the compart- " ments retains the solid matter to be lifted to the machine above, " the others hold the liquid which is to be pumped out; part of " it, by preference the strongest part, is pumped into the machine " just mentioned." This machine, termed "a washing appa- " ratus," consists of "one or more tanks or receivers divided by " double partitions with space between, one of each pair of par- " titions being fixed to the top the other to the bottom of the " tank." In these tanks are agitators (fans, beaters, plungers, &c.), (jets of steam, air, or liquid thrown upon or into the sewage to be purified). The sewage flows over, under, or through the partitions, leaving the heavy matter, as grit and sand, &c., behind. Heat is sometimes used in this process. The sewage thus separated by means of the partitions, &c. is passed into what is called the " ammonia tank, in which the organic and other substances " held in suspension are combined with lime or lime liquor, with

" or without soda or potash, made by preference with sewage " water pumped into a tank for that purpose, which tank communicates with the ammonia tank, and supplies the required " amount." The "ammonia tank" has "a dome top and pipe " communicating with a bulb condenser charged with hydrochloric acid." The ammonia thus freed passes into the condenser and "becomes sal ammoniac in solution; it is afterwards " converted by evaporating pans into crystallized sal ammoniac." The remainder of the processes are for making manures and deodorizing sewage and other refuse.

[Printed, 10*d*. Drawing.]

A.D. 1866, April 27.—N° 1180.

TOBIN, Thomas William.—(*Provisional protection only.*)— " Apparatus for effecting a solution of lime for the purpose of " softening hard water." This consists as follows:—"The best " form for this chamber is that of an upright cylinder, but for " convenience it may be either rectangular or any other like form. " Two openings are provided to this chamber, one at the top to " admit of insertion of the lime, the other at the bottom for the " supply of water. Over the latter is placed a covering of wire " gauze or a perforated cap, in order to spread the water in the " presence of the lime on its entrance into the chamber." There is an "air-tight chamber of a capacity of not less than 6 inches " cube" "attached to the supply at a convenient distance from " and communicating with the lower aperture in the first chamber. " By an arrangement in the supply of water a quantity of air is " maintained in the upper part of this chamber, and the whole of " the water supplying the first chamber is passed through this " second chamber. A mixture of lime water to about the consistency of thin paste is placed through the upper opening into " the first chamber, and there falls by its weight, covering the " opening at bottom. The water now entering disturbs and " passes through the lime to the top of the chamber, saturated or " nearly so with lime. The water so obtained may be withdrawn " by means of a syphon from below the surface, which is ordinarily " covered with a screen." This lime water is used to soften water in the proportions set forth in N° 8875, 1841, not abridged in this series, and the whole is filtered "through charcoal or other " filtering material."

[Printed, 4*d*. No Drawings.]

A.D. 1866, May 3.—N° 1256.

SPENCE, Peter.—(*Provisional protection only.*)—" Improve-" ments in the separation of certain metals from their ores, and " in the production of sulphide of ammonia to be used in the " process, which sulphide is also applicable to other purposes for " which that salt is required." These are, using solutions of ammonia or its carbonate "for dissolving such metals from their " ores as are soluble in those substances." Copper and other metals thus dissolved are precipitated by sulphide of ammonium and the sulphide removed; "the ammoniacal solution is ready " for extracting or dissolving metals from other quantities of ore." The ammonia may be distilled off. "The quantity of sulphide of " ammonia necessary for precipitating the metal may be deter-" mined, as is usual in similar chemical operations, by applying " test portions." The sulphide of ammonia to be used as above described is produced by "distillation from solutions of ammo-" nia or a salt of ammonia mixed with sulphide of calcium." For this purpose it is proposed "to use the waste of the soda manu-" facture, commonly called soda waste, and also the waste lime of " gas works." The proportions used are "about one of the salt " of ammonium to two of thė sulphide;" for the ammoniacal solution to mix with the said waste products it is proposed "to " use the weak ammoniacal solutions made in washing the copper " or other metal ores" from which the metal has been extracted, " and also the ammoniacal water of gasworks; sulphide of " ammonium produced as above is applicable to other purposes " where such salt is required."

[Printed, 4*d*. No Drawing.]

A.D. 1866, May 8.—N° 1317.

SWANN, John Russell.—"Improvements in lime kilns or " apparatus to be used in burning lime." These are said to be in "the combined arrangement of kilns," and in "supplying a " blast of heated air to kilns suitable for burning lime," as follows:—In one stack or block are constructed a number of chambers to receive the limestone, each having an open arch at the front for charging and discharging and also for firing in the usual way. "The chambers are each vaulted over at the top and " two flues pass out from the top; one of them dips down and " enters the next chamber at the bottom, the other passes direct

" to a chimney in the centre of the stack or block of burning " chambers." The flues are all furnished wtth dampers. "The " chambers then being charged with limestone, one of them is " fired at the front in the usual way, and the hot products from " this chamber pass by the flue into the bottom of the next cham- " ber and ascend up through the charge within, and thus the " limestone in this second chamber is dried and the burning " commenced." If the hot air is not too much cooled it is passed into a third chamber; if otherwise, it is "allowed to pass at once " to the chimney." "When the limestone in the first chamber " is burnt, either completely or in part, the firing in the second " chamber is commenced, and so on. With each chamber is combined "a passage at its lower part to conduct into it a blast or " current of heated air, and in this way the limestone is prepared " for burning." It is preferred to "apply the heated air before " the products from the adjacent chamber which is being fired " are applied. Apparatus to obtain a hot air blast may be com- " bined with lime kilns of other construction."

[Printed, 10*d*. Drawing.]

A.D. 1866, May 9.—N° 1332.

ROWLAND, ROBERT.—(*Provisional protection only.*)—" An im- " provement in the manufacture of metallic acetates and car- " bonates simultaneously with the production of vinegar and " glucose." This consists in the manufacture of glucose. Starch, sawdust, or other vegetable matter are added to a boiling solution containing about two per cent. of sulphuric acid, an acid vapour containing sulphurous acid and oxygen arises. The liquid is drawn off into a second vessel and neutralized with carbonate of lime, and the carbonic acid gas from this and the gases from the first operation are conducted by air-tight pipes in preference through the hollow journals of "a revolving drum containing " ledges or shelves for raising up and allowing to fall the particles " of lead through the gases and vapours that are introduced " through hollow journals of the drum" in order to expedite the manufacture of white lead. The flow of the gases is regulated by cocks or valves, and "to remove any traces of acetate" "carbonic " acid gas and oxygen may be admitted at the last portion of the " operation." "The refuse of the manufacture of glucose, the " washing of the filters, common molasses, cider, and other

" vegetable matters " are made into vinegar, and carbonic acid obtained for the carbonation of lead. For this a saccharine fermentation is caused to take place, and the liquid filtered through a layer of marble dust, which retains the gummy and slimy portions of the liquid, so that the vat containing shavings, &c. may not become obstructed. The gases are conveyed away as before. " To manufacture disacetate of copper, usually known " as verdigris," sheets of copper are exposed in a close chamber to " the acetous vapours which arise during the manufacture of vine- " gar, and introduce carbonic acid gas in addition wherever there " may not be sufficient from the fermentation in the manufacture " of vinegar." Whenever the vinegar is boiled the steam conveys away the acetic acid, and the metallic acetate or carbonate are supplied with facility.

[Printed, 4*d*. No Drawings.]

A.D. 1866, May 11.—N° 1355.

WELDON, Walter. — (*Provisional protection only.*) — " Im- " provements in the production of sulphide of sodium, and in " the treatment thereof for the manufacture of soda." These are, first, obtaining sulphide of sodium by " heating in admixture " together (in any proportions) chloride of sodium or common " salt, sulphate of magnesium having with it at least one " equivalent of water, and coal, coke, or other convenient form " of carbon ;" the result is " a mixture of sulphide of sodium " and oxide of magnesium or magnesia," and sulphuric acid which is evolved. " If preferred free sulphuric acid or certain " metallic sulphates other than the one mentioned (such, for " example, as the sulphate of aluminium) may be used instead of " sulphate of magnesium, but the use of the latter sulphate will " usually be the most advantageous."

Second, " the decomposition of sulphide of sodium with pro- " duction of either caustic soda or carbonate of sodium," and " the continual reproduction both of the reagent whereby this " decomposition is effected and of the compound by means of " which when manufacturing soda by the combination of pro- " cesses in question the sulphide of sodium is produced." These two objects are attained " by causing to react upon the sulphide " of sodium the oxide or carbonate of some heavy metal, a " sulphide of which can be obtained by treating sulphide of

" sodium with its oxide or carbonate in presence of water by " ebullition or otherwise, and which heavy metal is further " characterized by its sulphide being convertible into soluble " sulphate, either by roasting or by mere exposure to the atmosphere," and "finally decomposing this sulphate in solution " by means of magnesia." "Manganese" "is one of the metals " which may be advantageously used in this new process of " manufacturing soda." In preference to obtain "carbonate of " heavy metal by means of sulphate of heavy metal, oxide " of magnesium and carbonic acid should be performed in a " closed vessel into which carbonic acid is forced under " pressure."

[Printed, *4d.* No Drawings.]

A.D. 1866, May 12.—N° 1365. (* *)

PRICE, Astley Paston.—(*A communication from Jakob Bührer and Carl Hamel.*)—" Improvements in the means of " effecting the combustion of fuel and in apparatus employed " therein."

They relate to the process described in Specification No. 956, A.D. 1866, and consist in using an exhaust or blowing fan, and a self-acting arrangement for feeding in the finely powdered fuel.

The air blowing or exhausting apparatus is preferably driven by the same prime mover. This system of combustion is applicable to steam boilers, and also to the burning of bricks, lime, cement, pottery, and similar goods, in which latter cases, the materials to be burnt may be so stacked as to themselves form the combustion chamber for the powdered fuel.

The self-acting feeder for supplying the powdered fuel consists of a conical hopper, fitted with a conical plug to the upper end of which is attached an open cage. " A vertical spindle is attached " to the conical plug, and passes through a collar bearing on the " mouth of the hopper, an adjustable collar on the spindle " serving to regulate the height of the plug, and consequently, " the size of the feed orifice." " A horizontal lever arm is " attached to the upper end of the spindle, and to this arm is " connected a reciprocating rod," worked by the prime mover. A number of such hoppers worked simultaneously in this way are employed. Instead of conical plugs, " rotary cocks, valves, " or regulators, or reciprocating slides" may be also adapted to the hopper, but in all cases the fuel is fed in in concert with the apparatus for supplying the air for supporting combustion. This air is preferably heated by means of the waste heat of the combustion chamber or the furnace or flues.

A pottery kiln is shewn with a long deep combustion chamber, into which the powdered fuel is fed from a self-acting hopper, and which is supplied with heated air through perforations in a flue lying parallel to it.

In brick, lime, or cement kilns, the materials being so stacked as to leave interstices for the descent of the powdered fuel, a number of feeding hoppers are disposed along the top of the kiln. The plugs on either side are simultaneously acted upon by one long rod connected to a number of levers by means of pins.

[Printed, 8*d*. Drawing.]

A.D. 1866, May 22.—N° 1442.

MARÇAIS, Joseph Jean.—"Certain improvements in the "treatment of slags, ores, and compounds of tin." These are, "subjecting them at a high temperature to the action of hydro-"chloric acid gas;" and in reference to this subject as follows:—The scoriæ is pulverized, sifted through a sieve of copper wire, of about 40 or 50 threads or wires to the square inch is most suitable for the purpose, adding to it a little coal, coke, or charcoal, preferring the latter, pulverized and sifted, and making into lumps or blocks with starch, glue, treacle, pitch, tar, or other similar substance, dried and burned. "The volatile matter evaporates, "and the lumps are left spongy and permeable or porous;" these lumps are then packed in a fire-clay retort, carefully luted, and heated just below the temperature at which the lumps would begin to melt, which is about a cherry-red heat. A current of hydrochloric acid gas (H Cl) is passed through the lumps, and the vapours are carried by a pipe into a vessel provided with a series of other vessels fitted with tubes, and intended to receive and collect the vapours which are not condensed in the first vessel; there are also jars or vessels for condensing the hydrochloric acid gas not exhausted in its passage over the scoriæ. The gaseous products circulate in long damp flues and pass into chimneys. The contents of the receivers are boiled and filtered. The solution contains "a profusion of chlorides." "The follow-"ing only are in most cases of any interest as regards marketable

" or manufacturing purposes :—These are, chlorides of antimony, " tin, iron, manganese." The antimony is thrown down by a tin plate. The chloride of tin crystallizes from the solution of iron and manganese, and washed with a saturated solution of pure chloride of tin to free it from every trace of iron, manganese, or other chloride. To separate the remaining tin " a tin plate and " certain organic substances " are introduced in the ordinary manner, and the mother waters are treated " by carbonate of lime " also in the ordinary manner, which precipitates the tin and " leaves the iron and other metals in solution." The oxide of tin is calcined and washed with hydrochloric acid mixed with water to free it of lime, &c. and melted in a reducing furnace. " The " chlorides of iron and manganese, as well as the alkaline and " earthy chlorides which may exist in the liquor, are evaporated " till dry at a moderate temperature, to avoid volatilization; they " may also serve to produce hydrochloric acid." " Arsenic produced by roasting as well as that derived from the decomposition of arseniated hydrogen in the flues which communicate " with the chimney can also be used as well as that portion of " antimony which goes over as antimoniated hydrogen." The residual matters in the retort " which have not been attacked " contain nothing useful except a little chloride of tin and a " certain quantity of chloride of iron ;" these are washed out with acid water, and " the wash water is added to the preceding " solutions." " Scum or dross, impure tin, residue of working " alloys," are treated in the same way as scoriæ. Tin ore " is " first brought by washings to the requisite state for making " scoriæ," roasted if it contains too much sulphur, converted into scoriæ in reducing furnaces, with or without the addition of fusing agents, and pulverized and treated as scoriæ. The remainder of the Specification refers to obtaining of metals, and a description of the furnaces employed.

[Printed, 1s. Drawing.]

A.D. 1866, May 29.—N° 1493.

WHELPLEY, JAMES DAVENPORT, and STORER, JACOB JONES.—" An improved process and apparatus for obtaining " metals and saleable products from ores and minerals, adapted " particularly to the reduction of sulphurets." These are, first, " the simultaneous heating, oxidizing, and lixiviating finely

" powdered ores in a water furnace, whereby the constituents of " the said ores, capable of the reaction at the degree of heat em- " ployed, become soluble salts."

Second, "causing great rapidity in the process of 'cementation,' " or substitution of one metal for another in a saline solution, by " giving to the precipitating metal and solution a comparatively " rapid relative motion in the presence of heat."

Third, "the metallization of a reducible protoxide by passing " dry sulphurous acid over such protoxide strongly heated," forming sulphuric acid, which may be collected by any appropriate means.

Fourth, "constructing a furnace for lixiviating, containing the " following parts:—A tower, whose interior is in the form of a " frustum of a cone resting on its base; a horizontal flue divided " into communicating chambers by partial partitions; two or " more fire-boxes, or an annular fire-box at the top of the tower, " so constructed as to throw a plunging flame into the head of " the said tower; a trough of water at the bottom of the tower, " and chambers in which the lixiviation is effected; one or more " settling tanks exterior to the tower and chambers, but con- " nected with the water bottom of the furnace so as to provide a " means of circulation for the solution, and furnished with steam " tubes for extra heat if required; one or more spray chambers " connected with settling tubs, to put down and collect the dust " and gases of the air passing through the furnace; a propeller " working in the trough to maintain the circulation; a conductor " beyond the first spray wheel, having chambers for the collection " of the acids which have been absorbed by the spray, and resting " upon arches in a water bottom to allow the solid matters being " readily raked out."

Fifth, "feeding the ore floated on air by means of a fan blower " into the head of the furnace, balancing the draft of the furnace " by employing at the same time an exhaust fan or draft wheel to " draw air out of the furnace, and giving to the said draft wheel " sufficient power to deliver the additional volume occasioned by " heat and the formation of gases in the furnace.".

Sixth, "feeding the ore and fuel to the fan by means of an " apparatus which will not allow coarse material to enter inside " the case of the said fan."

Seventh, "the elimination of sulphurous gas from the air pass- " ing through the furnace, by feeding oxide of copper or other

" analogous protoxide in company with the sulphurets into the " head of the furnace."

Eighth, " providing inspection and cleaning holes in the sides " of the tower and chambers, and arranging the feed pipe of the " furnace telescopically, so that it may be opened and the furnace " cleaned, and yet will not leak when closed."

Ninth, " the employment of the property of variable solubility " at different temperatures in connection with continuous currents " of air passing over the surface of a solution, to speedily obtain " crystals of a salt." The apparatus consists " of a vat covered " by a flue connected with an exhaust fan to create the current of " air, the bottom of the flue being formed by the surface of the " solution."

The solutions in crystallizing yield sulphate of copper and sulphate of iron. Some solutions are evaporated to dryness, and " the residue will consist of crystals of impure sulphate of " copper," which are rendered " anhydrous by heat," and the sulphuric acid is eliminated " by appropriate means, of course " collecting and preserving the same," oxide of copper remaining, which may be reduced to the metallic state by various means.

[Printed, 3*s*. Drawings.]

A.D. 1866, June 2.—N° 1537. (* *)

PARAF, ALFRED. — (*A communication from Mathias Paraf-Javal.*)—(*Provisional protection only.*)—" Improvements in dyeing, " printing, and other operations based on chemical reactions."

The examples given are as follows :—" In order not to lose " the prussiate of potash contained in a bath," in place of crystallizing it out or throwing it down by a salt of iron, washing the precipitate, and decomposing it, &c., which operations it is said are " long and expensive," the oxide of iron is fixed " upon any " substances which wash easily, such as wood (wool ?), cotton, or " calico," and these are dyed in the solution containing the prussiate which is wanted, washed, and decomposed in a solution of potash. In like manner cloth prepared in tannic acid absorbs alkaloids from liquids, as strichnine, quinine, &c., and these alkaloids are obtained from the cloth by " decomposing or distil- " ling afterwards with an alkali." " In another case in the " manufacture of aniline mauve, either by chromates, permanga- " nates, or similar salts, there is a great quantity of a black

" precipitate found which has to be separated by washing from " the mauve coloring matter. Not only this black is almost of " no value, but the washing forms a very long operation." This is done once by fixing in the fibre chromate, permanganate, or similar salts, and then " dyeing in a salt of aniline both black " and mauve are fixed in the fibre." The brown is removed by washing first in an alkaline water, on boiling the fibre in a high-pressure apparatus with "alcoholized water," the "only pure " mauve" is dissolved, and the black remains fixed in the fibre. Oxide of manganese and manganese salts are employed in like manner. "The same process of precipitating in the fibre" is used "for the purification of aniline blues." Extreme cold is employed (the freezing machine of M. Carre) "to moderate or " prevent chemical reactions," and in passing cloth or yarn through a mixture of chromic acid and aniline salts thus kept cold it remains of a lemon yellow color, but when it comes out of the liquid the fast black is found insoluble in the fibre. Thickened chromic acid, a resist upon Turkey red, or thickened hypochlorite of lime, a resist upon indigo, not keeping in the usual temperature, keep any length of time in the cold state. Plaster and water, and all kinds of cements, &c. remain soft, also lactarine is undecomposed by lime or strong alkalies when below zero.

[Printed, 4*d*. No Drawings.]

A.D. 1866, June 18.—N° 1639.

WOODS, John Edward Tennison.—" Improvements in the " manufacture of pigments." These are said to be, " the appli-" cation of the sublimated lead or lead soot for the purpose of " manufacturing pigments," as follows:—By treating the sublimated lead or lead soot with heated muriatic acid, " or by treating " them" with a saline chloride, such as chloride of sodium or common salt, chloride of lead is formed, which being dissolved in hot water, and the lead precipitated therefrom, will leave a white pigment suitable for various useful purposes. "Any of the " various well-known re-agents may be used for precipitating the " lead, according to the color of the pigment, or nature of the " residue required." Another method consists in calcining the lead soot at a low heat in a reverberatory furnace, " whereby it " becomes converted into a white oxide of lead and sulphate of " lead;" it is converted into a chloride by heating it in hydrochloric acid, or the calcined lead soot is mixed with a solution of common salt or other saline chloride, and left to stand in a cold or heated state, and thereby the oxide is converted into an oxychloride of lead, and there remains as a residue soda or other alkali; and then "treat the oxychloride thus produced with an " extra quantity of hydrochloric acid, and thereby convert it into " a chloride of lead." There is nothing said in the Provisional Specification about calcining the lead soot, or of its treatment after calcination.

[Printed, 4*d*. No Drawings.]

A.D. 1866, June 26.—N° 1703.

LAKE, William Robert. — (*A communication from William Bell, Thomas Mara Fell, and Ambrose George Fell.*)—" Improve- " ments in the manufacture of white lead." These are, the ores being well ground are oxidized by roasting or calcining, and submitted to dilute nitric acid in vessels lined with lead, or of glass, or porcelain, &c. The nitrate of lead drawn off is treated with sulphuric acid, in order to leave a portion of the lead still in solution, so as to prevent an excess of sulphuric acid. The nitric acid, in solution or distilled off, is again used as a solvent. The sulphate of lead soon settles or subsides, and is removed for further treatment. In the treatment of metallic lead the lead is first made into a sponge by pouring it into water, and the sponge is then treated with the solvent and precipitant as above described, or it is made into oxide as in making litharge. Acetic acid may be used in place of nitric, but larger quantities must be used. The sulphate of lead obtained as above is boiled from two to three hours with a solution of alkali amounting to about three per cent. of the quantity of sulphate, the result is " a subsulphate " of lead, and which possesses qualities superior to the best white " lead of commerce hitherto known," and which is collected and dried in pans or shelves. "The constitution of the sulphate " may be first changed into a carbonate of lead by the use of a " carbonate of an alkaline base, and finally treated with the alkali " solution." " The alkali solution may be made from either " potash or soda."

[Printed, 4*d*. No Drawings.]

A.D. 1866, June 28.—N° 1726.

BROOMAN, Clinton Edgcumbe.—(*A communication from Cyprien Marie Tessié du Motay and Charles Raphael Marechal,* *junior.*)—" Improvements in obtaining alkaline permanganates." These are, the " employment in substitution for water of sulphates " of lime, or of magnesia, or the chlorides, carbonates, fluosilicates " of lime or of magnesia for the purpose of producing " permanganates of potass and of soda, either in the state of concentrated " solutions, or of dry paste or pulp," by triturating them up together.

[Printed, 4*d*. No Drawings.]

A.D. 1866, July 2.—N° 1752. (* *)

BONNEVILLE, Henri Adrien. — (*A communication from Alexandre Martin and Albert Béranger.*)—(*Provisional protection only.*) — " Improvements in the construction of furnaces and " kilns." They relate to " furnaces for the melting of ores, and of " kilns for the baking of porcelain, pottery, lime, and for drying " peat, washed kaolin," &c.; and " consist in doing away with " the ventilators now used, and replacing them with an aspirating " contrivance adapted to their upper parts, which are provided " with only one requisite opening to allow the said operation to " take place." Their lower parts are provided with openings " proportional to the force of the aspiration."

[Printed, 4*d*. No Drawings.]

A.D. 1866, July 7.—N° 1794. (* *)

KUNSTMANN, Robert.—(*Provisional protection only.*)—" Improvements in burning and drying bricks, pottery, earthenware, clay, lime, and cement, and in the apparatus employed " therein." They relate to constructing kilns for burning in a continuous manner bricks, pottery, earthenware, clay, lime, cements, &c., and also to drying bricks previous to their being burnt.

The kiln consists of chambers communicating with each other and with a chimney by flues having dampers for determining the communications. Each chamber is heated by fire-places situated in the sides.

The grate is composed of parallel bars arranged in the form of steps, forming a stepped fuel surface. The exterior of each grate is closed by hinged doors, one of which is opened when supplying fuel, and the others for clearing the bars. In the bottom of each chamber are perforations communicating with a flue beneath, which communicates with the adjoining chamber. It has also a branch leading from it to the fire-places, either of which communications may be opened or closed by dampers. Openings in the roof communicate with flues which lead direct to the chimney. When a number of chambers are employed they are constructed in two parallel rows, with a tramway between them, and preferably with the doors of each row opposite each other; or the fire-places in each row may be opposite each other, and the kiln doors on the outer sides. In using these kilns the hot air is taken from that chamber in which the bricks are cooling. It is caused to pass by the bottom flue through the fire-places of the adjoining chamber. From the chamber in which the bricks are burnt the air passes downwards through the bottom into the flue beneath, and is conveyed into the next adjoining chamber through the openings in the floor. These last chambers communicate with the chimney by the openings in the roof and the flues above them. " By the time the bricks in the first-mentioned chamber have " been sufficiently cooled to be removed, the bricks in the next " one are burnt, and the first chamber may be refilled whilst the " hot air from the second passes through the fire-grate of the " third kiln or chamber, and so on throughout the series, the " process being continuous."

[Printed, 4*d*. No Drawings.]

A.D. 1866, July 13.—N° 1838. (* *)

LAW, James.—(*Provisional protection only.*)—" Decolorising " the products obtained in the distillation of shale, coal, and wood, " including tar, for the purposes of dipping, pouring, and smearing " sheep, and thus preserving the purity of color, and the " healthy condition of the wool." This consists in decolorising " carbolic, cresylic, and phenic acids of creosote of the lighter and " heavier products of the distillation;" of the above substances, " as well as of the salts and other compounds or mixtures, into " the composition of which any one or more of these agents " enter" by "the addition of one or other of the following:— " Acetic acid, malic acid, tartaric acid, benzoic acid, of the salts " into the composition of which any one or more of these acids " enter, and of the compounds or mixtures natural or manufac" tured, of which any of these forms a part."

[Printed, 4*d*. No Drawings.]

A.D. 1866, July 24.—N° 1917.

DAVIES, George.—(*A communication from Paul Rémond.*)—(*Provisional protection only.*)—" Improvements in the manufac-" ture of sulphate of soda and sulphate of potash." These are, passing "sulphurous acid (obtained either by burning sulphur or " by heating iron pyrites or sulphurous ores, in presence of " oxygen), mixed with a proportionate quantity of atmospheric " air over or through oxide of copper or oxide of chrome, or a " mixture of the two heated to dull redness, or over or through " any other well-known oxide or substance capable of inducing " the chemical combination of sulphurous acid and oxygen." Sulphuric acid is formed, while the oxide remains unchanged. The sulphuric acid "is now conducted into a vessel containing " chloride of sodium or chloride of potassium in the usual pro-" portions, either wholly or partially in solution, and gently " heated." The sulphate of potash or soda is produced, and " the hydrochloric acid gas evolved during the formation of the " sulphates may be collected by suitable condensers.

[Printed, 4*d*. No Drawings.]

A.D. 1866, July 26.—N° 1948.

WELDON, Walter.—" Improvements in the manufacture of " chlorine." These are, first, the oxidation of the protoxide of manganese into the sesquioxide, "by blowing air through water or " other liquid holding the protoxide in admixture or suspension." " Still liquor" or chloride of manganese obtained in any other way, in preference, is treated by any well known method to get rid of the iron it may contain, and the protoxide of manganese thrown down by lime or soda or another base afterwards named, and the mixture put into a vessel with a false perforated bottom, and air injected between the bottoms, in preference by a blowing engine. This oxide is used to liberate chlorine from hydrochloric acid.

Second. Decomposing the chloride of manganese by boiling it with magnesia in place of using lime or soda, and then " de-" composing the resulting chloride of magnesium by evaporating " its solution to dryness, and then heating the residue in a " current of steam." Magnesia remains, and hydrochloric acid " is evolved and condensed." In the Complete Specification it is said that this part of the invention cannot be recommended,

" except to manufacturers who may have a specially suitable " magnesia, the source whence which may be obtained " the " patentee is unable to indicate."

Third. Another method of utilizing the chloride "obtained by " the reaction upon chloride of manganese," either by decomposing it "by means of sulphuric acid, so as to obtain hydro- " chloric acid and a useful sulphate," sulphate of calcium for paper making, &c., or sulphate of magnesium for medicinal use, &c., "or in treating it with any saline compound by double " decomposition with which a useful product or useful products " can be obtained," as sulphates of magnesia, zinc, or iron, and the chlorides decomposed by heat into hydrochloric acid and the base. In the Provisional Specification it is said the sulphate may be ignited with carbon so as to obtain sulphurous acid, but nothing is said of this in the Complete Specification.

[Printed, 6*d*. No Drawings.]

A.D. 1866, July 31.—N° 1969.

HILLS, FRANK CLARK.—(*Provisional protection only.*)—" Im- " provements in the manufacture of oxalic acid." These are, " forcing atmospheric air into what is technically termed 'oxalic " 'acid mother liquor' during the time the nitric acid is being " added to it, and the treacle or other substances used to make " the oxalic acid in the usual way. The air should be forced by " a force pump or other suitable means into the lower part of the " vessel containing the 'oxalic acid mother liquor,' and should " be made to pass upwards through the said liquor, so as to come " well in contact with it, by which means the escape of nitrous " acid fumes is greatly prevented, and a smaller quantity of nitric " acid will be required to make the oxalic acid."

[Printed, 4*d*. No Drawings.]

A.D. 1866, August 6.—N° 2026.

NEWTON, WILLIAM EDWARD.—(*A communication from Hadyn Mozart Baker, Joseph Henry Poole, and William Ralph Stace.*)— " Improvements in the manufacture of carbonates and bicar- " bonates of soda and potash, the soluble and insoluble silicates " of soda and potash, and muriatic acid, from chlorides of " sodium and potassium." These are as follows :—" Equivalent " proportions of nitrate of soda and sand (silicic acid) are mixed

" together intimately, and distilled in a clay retort, silicate of " soda is formed, and nitric acid is evolved and condensed. The " nitric acid is used to decompose chlorides of sodium or potas- " sium and water in a clay retort, and condensing the muriatic " acid. Nitrate of potash or soda is left in the retort, and may be " used with new quantities of sand for the formation of a silicate " and nitric acid. The sulphates of potash and soda are fluxed " with sand, while the sulphuric acid distilled may be used for " the decomposition of the chlorides precisely like the recovered " nitric acid. The silicate of soda or potash after complete solu- " tion in water," carbonic acid generated from burning limestone, or oyster shells, or chalk " is forced " into the silicate solution by " means of steam or by a force pump; or if the operation be con- " ducted in a glass-house, the carbonic acid may be taken from a " pot where glass is forming from sand and carbonate of soda or " potash by the use of any apparatus which will convey the car- " bonic acid to the silicate solution." " For the manufacture of " glass and nitrate of soda simultaneously, the nitrate of soda " and silicic acid are mixed in such proportions as to form an in- " soluble silicate," and the nitric acid is conducted to a mixture of chloride of sodium and water, which afterwards distilled gives hydrochloric acid and a solution of nitrate of soda, which may be crystallized out and mixed with new quantities of sand.

[Printed, 4*d*. No Drawings.]

A.D. 1866, August 8.—N° 2043.

SPENCE, PETER.—" Improvements in the production of sal " ammoniac in a commercial form." These are as follows:— " Chloride of ammonium produced by any ordinary chemical " means may be used," but in preference the crystals of the salt are taken and dissolved in hot water to saturation, and the clear liquor is " then placed in a cooler, and kept continually stirred," by which means are obtained " minute crystals or fine granulated " powder." This is drained thoroughly, " or the mixture may " be extracted by the well-known centrifugal apparatus," and the drained powder placed " in metal moulds of any desired form, " and by means of plungers fitting the said moulds, submit it to " pressure in a hydraulic or other press with sufficient force to " compress the particles into a solid cake." " To facilitate the " removal of the cakes the moulds may be made slightly tapered,

" and they may be provided with loose bottoms, which can be " forced upward."

[Printed, 4*d.* No Drawings.]

A.D. 1866, August 11.—N° 2066. (* *)

CLARK, WILLIAM.—(*A communication from Eugène Alphonse Cotelle.*)—" Improvements in the utilization of chloride of man- " ganese (residue of the manufacture of chlorine) in the manufac- " ture of peroxide of manganese, chlorine, and hydrochloric acid, " and in the apparatus for the same." These are as follows:— The chloride of manganese solution is let in from a receptacle in front and above a large furnace similar to those used in the manufacture of sulphate of soda, the sole of which is flat and slightly inclined from front to back. This furnace or retort is kept at a red heat continually; an orifice is also left in the door in front for the introduction of air; it is about half the size of the escape pipes. There is a pipe from this retort communicating with a series of chambers, thirty in number, in which the water and hydrochloric acid are condensed; beyond these chambers is a chamber containing a series of trays " containing chloride of lime " in which the chlorine is absorbed;" at the top of this chamber leading from it is a pipe in communication with a chimney for producing a draught. Peroxide of manganese remains in the sole or bottom of the retort or furnace. In using the chloride of manganese in a solid form in place of liquid, the liquid chloride is dried " in a receptacle formed of bricks laid in mastic, silicate of " soda, and amianthus; under the crown of this receptacle passes " the waste heat of the decomposing furnace, the flame of which " is thus brought in contact with the liquid and so readily evapo- " rates it." " If the chloride be in the mass it is preferable to " place it in the decomposing furnace." The carbonic acid and moisture from the air entering the apparatus, is absorbed by passing through quicklime. By the above arrangement the same manganese will serve for an indefinite period. Another mode is to place the peroxide of manganese in the above apparatus and to introduce therein a continuous jet of hydrochloric acid, regulating the temperature and flow of hydrochloric acid; the latter will disengage all its chlorine, and the peroxide of manganese will be indefinitely regenerated.

[Printed, 10*d.* Drawings.]

A.D. 1866, August 14.—N° 2077.

ROWBOTHAM, SAMUEL. — (*Provisional protection only.*)— "Making caustic soda from common salt or chloride of sodium "by the action of lead or its oxide, and afterwards recovering the "lead, as oxide or otherwise, for use again in making caustic soda "from common salt." This consists as follows :—Common salt or chloride of sodium is "mixed with lead and fused together, or "mixed with oxide of lead and water, or kept moist by steam, "and allowed to stand, either cold or aided by heat, until de- "composition takes place, the mass to be then lixiviated, and "the caustic soda separated. The chloride of lead which remains "is then to be subjected to the action of heat and oxygen, either "derived from the atmospheric air, or water, or steam, or other- "wise obtained, until the chlorine is driven off, and the lead re- "covered in a state to be again used for the decomposition of "common salt; but as the lead is not always recovered by this "process in the most fit condition for decomposing a further "supply of common salt," it is mixed "with charcoal, lamp- "black, crushed coal, or other carbonaceous matter," and subjected "to the action of heat until the lead is restored to the con- "dition required for again decomposing common salt."

[Printed, 4*d*. No Drawings.]

A.D. 1866, August 17.—N° 2114.

HUGHES, EDWARD THOMAS.—(*A communication from Charles Large.*)—(*Provisional protection only.*) — "The application of "chlorine for the condensation of nitrous gas, and improve- "ments in the apparatus connected therewith." This consists as follows :—"Adapting to the first of a series of about twenty "jars, one or more vessels for the production of chlorine, accord- "ing to the extent of the manufacture." These jars are connected with the "boiler or vessel in which the reactions take "place which produce the nitrous gas." "When 3,000 killos. of "copperis" are acted on "by 4 to 500 killos. of nitric acid, two "apparati for evolving chlorine will be sufficient. Each chlorine "apparatus contains 50 killos. of bi-oxide of manganese, on "which is poured 150 killos. of hydrochloric acid, and then both "are heated to about 100° centigrade in a water bath or by means "of steam." "By this system no gas is lost, and about 50 per "cent. of the nitric acid employed is regenerated."

[Printed, 4*d*. No Drawings.]

A.D. 1866, August 24.—N° 2179.

DE BERENGER, PHILLIP ARTHUR. — "Improvements in "lime and cement kilns." This consists of a tunnel or oven of brickwork or other masonry, in which "a series of portable kilns "of corresponding size and shape thereto are employed, so as to "work upon friction rollers mounted upon channel ways formed "in the bed of the said tunnel, by the arrangement of which "the said limestone, cement, or other substances to be operated "upon is placed and carried forward to the furnace, burnt, and "finally discharged in continuous succession, whereby a constant "supply to or from the kilns direct from the quarry is main"tained." There is "a furnace and chimney at opposite ends of "the said tunnel in connection with circulating flues for diffusing "and conducting the heat above and below the said substances "to be rendered incandescent, being also employed and arranged "so as to admit of the portable kilns (formed of open gratings "or otherwise) being brought forward in turn, and allowed to "remain over the furnace until sufficiently burned." Also employing "for the purpose of further confining the heat, gutters "filled with sand arranged longitudinally within the said tunnel "immediately beneath, and in contact with the side flanges formed "at the lower base of the trucks or portable kilns."

[Printed, 8*d*. Drawing.]

A.D. 1866, August 29.—N° 2230.

DAVIS, JAMES.—"An improved method of treating limestone, "and applying the products for purifying and rendering water "palatable, and for imparting a briskness to other beverages, as "also for utilizing the substances to the various purposes of the "builder." This consists, in reference to this subject, as follows: —Limestones or magnesian limestones "alone or combined, "and mixed or not, with carbonate or bicarbonate of soda, "or carbonate or bicarbonate of potassa or both," are placed in a retort, in preference in one such as is usually made use of in "the production of gas for purposes of illumination, secured and "heated in like manner, and provided with a waste discharge "pipe or pipes leading into a chamber or tank to receive for use "the carbonic oxide gas or gases set free." Otherwise the materials are introduced "into a suitably constructed retort fitted "with gas discharge pipe to be put into an ordinary household

" grate; otherwise one or more of such retorts into a boiler, steam " boiler, stove, furnace, or other convenient situation for being " surrounded with fire," or the retort or retorts are set " in an " ordinary lime kiln, reverberatory furnace, coke oven, or furnace or oven of any suitable form, either alone, side by side, or " one above another," and submited to a " heat high enough to " enable the whole to assume a white aspect, ultimately sustaining that high temperature until the expulsion of the whole of " the carbonic oxide gases in the raw material or materials be " perfected, the gases discharged to waste or for use, and the " substances converted to the caustic condition." The substances thus prepared and the gases evolved are applied as is stated in the title above.

[Printed, 4*d.* No Drawings.]

A.D. 1866, September 4.—N° 2273.

PARAF, ALFRED, and WANKLYN, JAMES ALFRED.—(*Provisional protection only.*)—" Improvements in the extraction of " iodine and bromine from kelp." These are, avoiding the loss occasioned by heating the kelp at high temperatures " as in the " ordinary process of manufacturing iodine," by " converting the " kelp into oxalates and other salts by a well known process, which " consists in heating it strongly with caustic alkalies. This " process of heating woody fibre with caustic alkalies is in use in " the arts for the manufacture of oxalic acid." Having heated the kelp with caustic alkalies, a saline mass is obtained " from " which oxalic acid is extracted by well known processes, and " there remains a mother liquor containing all the iodine and " bromine originally present in the kelp. The iodine and bromine is to be extracted from this mother liquor by the well " known processes."

[Printed, 4*d.* No Drawings.]

A.D. 1866, September 14.—N° 2362.

ROBINSON, GEORGE.—(*Provisional protection only.*)—" Improvements in the manufacture or production of ammonia, " baryta, and strontia." These are, in preparing ammonia, carbonate or caustic, baryta, carbonate or caustic, strontia " is first " intimately mixed with coal, charcoal, or other carbonaceous " matter, and heated for some time to whiteness in a close retort.

" or furnace. On withdrawing the charge and bringing water or " steam in contact with the red hot mass, fumes of ammonia are " copiously evolved and are to be collected and fixed in the usual " manner." The caustic baryta or strontia are dissolved out of the mass by water, and crystallized by evaporation, and are applied as above or for other useful purposes. To obtain caustic baryta or strontia from the sulphates, the sulphates are intimately mixed with coal or other carbonaceous matter, and heated to whiteness for some time in a close retort or furnace, sulphates of barium or of strontium are formed; and while the sulphuret "is " still intensely heated, being at least red hot, steam or water is to " be applied to it," in a close furnace with steam, sulphuretted hydrogen is evolved, which can readily be burnt into sulphurous acid and water, and be condensed, or "as sulphurous acid if the " watery vapour be brought in contact wirh the heated mass in " the open air," and in either case caustic baryta or strontia remain and may be applied as above, or may be otherwise utilized. " When bituminous coals are employed in the manufacture of " ammonia, baryta, or strontia by either of the above described " processes, the volatile matters proceeding from the decomposition of the coal, and consisting chiefly of coal tar and combustible gases, may be collected and utilized in any convenient " manner."

[Printed, 4*d*. No Drawings.]

A.D. 1866, September 25.—N° 2467. (* *)

NEILL, William, the younger, and SMITH, Philip.—(*Provisional protection only.*) — " Improvements applicable to the " manufacture of chloride of lime or bleaching powder, and in " apparatus connected therewith."

"An exhauster" is employed for transferring the chlorine gas used in the above manufacture " from one chamber to another, " or from the stills in which the gas is produced to the chambers " or receivers." " By these means the gas not taken up by the lime " is economized." "Any suitable exhauster may be employed," but it is proposed to employ one constructed as follows :—" There " are two vessels constructed after the manner of gasometers, " and sealed like them by being immersed in a fluid. These " vessels being caused to vibrate upon a centre of motion " alternately draw in the gas and discharge it through valves to

" the chambers or receivers. One vessel, however, may, it is " evident, be used if a single action only is required."

[Printed, 4*d*. No Drawings.]

A.D. 1866, October 8.—N° 2593.

BOUSFIELD, GEORGE TOMLINSON.—(*A communication from Panajota Wilhelm Hofmann.*)—" Improvements in separating sul- " phur from soda waste." These are as follows :—The soda waste is spread on the floor and sprinkled over and mixed with a solution of chloride of manganese, or of iron, or of both, the liquid residue of the preparation of chlorine, sulphides of manganese or of iron are formed. The same effect would be produced by adding newly precipitated sulphurets of manganese or of iron; "both of these " sulphurets are by the contact of air transformed into free " sulphur and higher oxydes of manganese or iron; these oxydise " the sulphide of calcium and give rise to several compounds " containing sulphur, calcium, and oxygen, soluble in water, " whose solutions on the addition of an acid or acid salt give " a precipitate of sulphur without disengaging a sensible amount " of sulphuretted hydrogen." "The prepared soda waste after " 8 or 12 days (less in summer, and more in winter time)" is lixiviated " with cold or hot water in tanks methodically arranged." A yellow lye is obtained, from which sulphur precipitates when treated with an acid liquor. The liquor is drained off and the sulphur pressed, or it " can be melted in contact with a weak " alkaline solution (with weak yellow lye) in a close boiler under " pressure, so as to raise the temperature above 110 degrees " centigrade." Any sulphuretted hydrogen evolved may be passed into a solution of perchloride of iron, or it may be burnt. " A very simple way and convenient apparatus for the evolution " of sulphuretted hydrogen consists in a leaden conical vessel, the " summit of the cone being adapted to an iron or leaden pipe " conducting the gas to the burner. The yellow lye and the acid " liquor are conducted separately by two lead pipes to the bottom " of the conical vessel." When the yellow lye is treated with solutions of chloride of manganese, acid or neutral, the precipitate on roasting " yields sulphurous acid, and the manganese left may " be used in making chlorine, or in case it contains two little " bioxide manganese" it may be heated in close vessels with nitrate of soda, and the nitrous fumes passed into sulphuric acid chambers. If a solution of chlorides of iron and manganese be added to the yellow lye, sulphuret of iron first precipitates, and the solution evaporated and calcined leaves "pure oxide and "sulphate of manganese, peculiarly adapted for the manufacture "of glass."

[Printed, 4*d*. No Drawings.]

A.D. 1866, October 16.—Nº 2671.

SWAN, Alexander.—"Improvements in and in apparatus for "evaporating or recovering lees." These are, first, "evaporating "or recovering lees by means of close vessels supplied with "steam, and caused to rotate in a tank or vessel in which the "lees are contained." In bearings in the sides of the tank or cistern are mounted the axes of a series of close vessels of cylindrical or other desired shape. In preference, the periphery of the vessels are made when cylindrical in the form of "toothed gearing, each vessel gearing into that or those next "adjoining," and rotary motion is imparted "to one of the "vessels by gearing connected therewith, so that all the vessels "are caused to rotate in the lees in the tank." The axes of the rotating vessels are hollow, and the vessels are supplied with steam by means of pipes.

Second. "Evaporating or recovering lees by means of fixed "close vessels, tubes, or boilers supplied with steam, and submerged or partly submerged in a tank or vessel in which the "lees are contained." The steam is from "a high pressure boiler "or otherwise" supplied by pipes.

Third. "Evaporating or recovering lees by means of an open "evaporating pan mounted or fixed on an ordinary steam "boiler, the shell of the boiler forming the bottom of the pan," and the heat given off from the boiler evaporates the lees.

Fourth. "The construction of the apparatus;" and the modes and apparatus "may also be applied for rendering alkali caustic. "The lees after being made solid by burning are again dissolved, "and impurities are allowed to separate by sinking to the bottom "of the vessel; the lees thus made pure are mixed with lime and "boiled as usual, as is well understood, and then concentrated by "evaporating according to any of the modes and by any of the "apparatus hereinbefore described."

There is nothing said about this in the Provisional Specification.

[Printed, 10*d*. Drawing.]

A.D. 1866, October 18.—N° 2691.

DARBEL, Alexandre Raymond François Nazaire.—(*Provisional protection only.*)—"Improvements in the manu-" facture of caustic soda." These are, "in the employment of " oxide of zinc dissolved in a solution of any of the caustic " alkalies, and then mixing it with sulphate of soda in solution," by which are obtained "soda caustic and sulphate of zinc."

[Printed, 4*d*. No Drawings.]

A.D. 1866, October 24.—N° 2749.

STEVENSON, James Cochran.—"Improvements in furnaces " for the manufacture of alkali." These are applicable to the manufacture of black ash by the revolving cylindrical furnace described in N° 887, 1853, and consists in so arranging the furnace as to admit of using the waste heat of the cylindrical furnace for the purpose of partially calcining the chalk or limestone, sulphate of soda, and coal mixed together, to be afterwards used in the cylinder, by attaching "to the exit end of the cylinder a rever-" beratory furnace, through which the waste heat from the cylin-" der is made to pass. This furnace is provided with a working " door on each side, and the chalk or limestone is charged into " it through an opening in the arch, and turned over by the " workman on the hearth or bed of the furnace, and when ready " to be transferred into the cylinder is cast into it with a paddle " through the exit opening of the cylinder, or the heated mate-" rials may be drawn out of the reverberatory furnace, and " elevated to the top of the cylinder and charged into it in the " usual manner. Beyond the reverberatory furnace is a surface " heat evaporating pan, over which the gases from the reverbera-" tory furnace play, and in this way the waste heat is farther " utilized." "When dried chalk or limestone is used it is " crushed so as to pass through a screen, of which the spaces are " 1¼ inches wide, but damp chalk may be used without being " crushed." "A charge of black ash is completed every two " hours."

[Printed, 4*d*. No Drawings.]

A.D. 1866, October 26.—N° 2768.

WELDON, Walter.—"An improved method of decomposing " chloride of sodium and other compounds by means of steam."

This invention, it is said, "is applicable also to both fluoride of "sodium and nitrate of sodium, and, moreover, to various other "sodium salts, including the sulphate, and to a great number of "compounds of other bases," and consists in heating the salt "to the point at which steam will react upon it, instead of by "simply applying heat externally to the vessel containing the "salt, either wholly or at least partially, by causing to come in "direct contact with the salt itself either atmospheric air or any "suitable gas or mixture of gases previously heated to the requisite temperature." In preference the salt is cast into large blocks, and heated highly in a separate vessel or furnace before introducing them into the decomposing furnace. These blocks are supported "in the vessel, oven, or furnace in which the decomposition is to take place, in such wise that the alkaline compound, "which is one of the products of decomposition, shall run down "their sides as it is formed, collecting on the bottom or floor," and so exposing a new surface of undecomposed salt; or the bottom or floor of the apparatus is supported "upon a hydraulic "ram, a powerful screw, or other ready means of altering its elevation at will." The salt is placed upon it, and at certain levels there are suitable receptacles into which the alkaline compound is run or swept by means of a rake or other suitable appliance from time to time; as the alkaline compound is removed the bottom is elevated. The sides may be made moveable as well as the bottom. When the salt is heated highly in a separate vessel it may be decomposed by steam alone, but it is preferred to use a heating agent as well as steam. If hydrate of sodium is desired, the gaseous products of a furnace yielding carbonic oxide are employed; if carbonate of sodium is required, the gaseous products of the furnace should be chiefly carbonic acid. When it is desired "to produce silicate or aluminate of sodium," the chloride of sodium is mixed with silica or alumina, and proceeded with as when using the chloride only.

[Printed, 4*d*. No Drawings.]

A.D. 1866, October 29.—N° 2791.

JOHNSON, John Henry.—(*A communication from James Alfred Wanklyn.*)—(*Provisional protection only.*)—"Improvements in the "preparation of iodide of ethyl and of other organic iodides." These are as follows:—Iodides of ethyl and methyl have, it is said, hitherto "been prepared by the employment of iodine, phosphorus, "and an alcohol," and it is proposed to substitute for these substances an iodide, as of potassium or of sodium, and of a saturated solution of hydrochloric acid gas. To produce iodide of ethyl, dry iodide of potassium or sodium pulverized is mixed with about an equal weight of a saturated solution of hydrochloric acid gas, and the whole distilled, and the distillate diluted with water, and the iodide, an oily fluid, is separated by "decantation or other-"wise, and is ready for use." "The iodide of methyl is prepared "in like manner, substituting wood spirit saturated with hydro-"chloric acid gas for the alcoholic solution before mentioned. "Other organic iodides may be prepared in like manner, their "alcohols being substituted for those before mentioned." Phosphoric acid may be employed in place of hydrochloric acid in the above processes.

[Printed, 4*d*. No Drawings.]

A.D. 1866, November 3.—N° 2858.

CLAUDET, Frederic.—"Improvements in treating waste solu-"tions obtained from burnt cupreous pyrites." These are, first, treating these solutions and obtaining sulphates and peroxide of iron.

Second, "precipitating from the solution of these salts cobalt "and other metals by means of alkaline sulphides, leaving a solu-"tion of sulphate of soda in a nearly pure state."

Burnt pyrites (cupreous) after recalcination with salt "so that "the salt in the waste liquors should consist of not more than 1 "equivalent of chlorides to every 2 equivalents of sulphates," the solutions are concentrated in cast iron or boiler plate pans similar to those employed in making salt, and the salts raked out as deposited, or they are evaporated to dryness in a reverberatory furnace, or by any waste heat available. The salts or residual mass thus obtained are calcined in a furnace, first at a low red heat increased gradually to bright red with stirring; a reaction ensues, the iron of the sulphate becomes peroxidized, the chloride of sodium is transformed into sulphate of soda with the evolution of hydrochloric acid, chlorine, and sulphurous acid, which are passed through a condensing tower, and "the gases thereby con-"densed serve for the lixiviation of the calcined ores." By keeping the charges at a red heat, the sulphate of iron is almost completely decomposed, whilst the sulphate of cobalt remains soluble. When no more fumes are given off and the mass has "become pasty it is withdrawn, and lixiviated in the same way as "black ash in the manufacture of soda," and the solution filtered from the peroxide of iron, "which remains in a beautiful scaly or "crystalline form of a dark reddish colour." This oxide is washed, and if necessary levigated and dried. "The clear solution "may be evaporated and an impure sulphate of soda obtained, "which may be more or less purified by crystallization." It is preferred, however, to add to the clear solution a slight excess of sulphide of sodium; the metals zinc, cobalt, nickel, and other metals are precipitated as sulphides and are separated, and the liquid evaporated to crystallization or dryness for sulphate of soda.

[Printed, 4*d*. No Drawings.]

A.D. 1866, November 12.—N° 2961.

STEVENSON, James Cochran, and **FRANCE, George Thornton.**—(*Provisional protection refused.*)—"Improvements "in the manufacture of soda or alkali." These, it is said, are "applicable to that part of the manufacture" called "balling "or black ash making when the operation is conducted in a "cylindrical revolving furnace" such as that described in N° 887, 1853. "The process as heretofore conducted has either been to "charge at once into the cylinder all the materials used in the "operation, namely, chalk or limestone, sulphate of soda, and "coal, or more usually to heat the chalk and a portion of the "coal, reserving the sulphate of soda and the rest of the coal," as described in N° 2957, 1855. These improvements consist "in "keeping back part of the coal used in the operation until the "rest of the materials previously charged into the cylinder have "been heated up to the point of incipient fusion." The usual proportions of chalk or limestone and sulphate of soda are put into the cylinder with about two-thirds of the usual proportion of coal. "These materials are gradually heated together in the "cylinder, and as soon as they have commenced to soften with the "heat and show signs of fusion," the cylinder is stopped and the rest of the coals added, after which the farther heating of the materials is continued and the black ash drawn out in the usual manner. "These improvements are also applicable to the manu-"facture of black ash from sulphate of potash."

[Printed, 4*d*. No Drawings.]

A.D. 1866, November 19.—N° 3030.

PRICE, Astley Paston.—(*A communication from Alfred Blügel.*) —" Improvements in the manufacture of carbonate of soda." These are as follows:—" In the production of carbonate of soda " and caustic soda " by the ordinary methods, " the leyes and the " alkali resulting therefrom frequently contain a proportion of " sulphur compounds, the presence of which is objectionable," and it is proposed to oxidize " the above sulphur compounds by " mixing either the leyes, or the crude salts obtained by the eva- " poration of the leyes, with a proportion of peroxide of manga- " nese or some substance containing manganese," and placing the mixture in a finishing furnace and applying heat, manganate of soda is produced. " Instead of heating the crude alkali with " oxide of manganese as before described, a solution of manga- " nate or permanganate of soda may be added to the leyes," so as to oxidize the sulphur compounds; the insoluble compounds produced are allowed to settle, and the clear leyes drawn off and evaporated. In order to prepare soda crystals, the solution, after dissolving the mass heated with peroxide of manganese, may be cleared by " adding to it a small proportion of caustic lime, or of " a solution of chloride of calcium;" the solution is also suitable " for making refined alkali, and " it may even be directly em- " ployed for many purposes where refined alkali has been hitherto " required." Nothing is said of this clearing process in the Provisional Specification. The oxide of manganese is to be employed in a finely divided condition. It has been " found that from one " to three pounds of oxide of manganese to one thousand pounds " of the alkali will give good results." " The before described " oxidation may also be adapted to the red liquors from which " caustic soda is prepared. A proportion of these liquors is " evaporated to a syrup and mixed with caustic lime and oxide " of manganese, and furnaced till of an intense green color, and " the solution added to the remaining red liquors, and the solu- " tion evaporated, or the whole of the red liquors may be treated " at once." In the Provisional Specification nothing is said of this treatment of red liquors.

[Printed, 4*d*. No Drawings.]

A.D. 1866, November 24.—N° 3091. (* *)

SEITZ, Carl Dietrich Julius.—(*Provisional protection only.*) —" An improvement connected with the bleaching of fibrous

" substances and with the manufacture of bleaching powder, " bleach liquor, or sulphuric acid." This consists " in com- " bining the bleaching process or processes with that either of the " manufacture of bleaching powder or bleach liquor, or sulphuric " acid, and thus making use of the same gas twice." " While " the chlorine gas which is to be employed in the manufacture of " bleaching powder, or of bleach liquor, as usual, is on its way from " the vessels in which it has been generated to the chambers or " boxes in which the bleaching powder is to be made, or to the " vessels wherein bleach liquor is to be made," it is brought " in " contact in any convenient vessel with the substances to be " bleached, these substances being dry, damp, or suspended in " water or other suitable liquid, the substances are thereby " bleached; after this the chlorine gas, both absorbed and not " absorbed, is conducted to the bleaching powder chambers or " boxes, or to the bleach liquor vessels in the usual way, and the " gas absorbed by the liquid and the bleached substance is ex- " tracted by applying some exhausting apparatus." Or instead of using chlorine gas employing " sulphurous gas in the same " way for the same purpose, the gas not absorbed being conducted " into chambers for the manufacture of sulphuric acid."

[Printed, 4*d*. No Drawings.]

A.D. 1866, November 24.—N° 3097.

LEATHER, JOHN KNOWLES.—" Improvements in the manu- " facture of salts of soda and potash." These are, " recovering the " portion of the salts of soda and potash which may be volatilized " during the manufacture of those salts," as follows:—" At any " convenient distance from the furnace the flue will be narrowed, " say, to twelve inches diameter or thereabouts, at which point a " jet of steam of, say, half an inch in diameter, more or less, will " be introduced and directed in a line parallel with the course of " the natural draught; beyond this point the flue is to be widened " either gradually or suddenly," but gradually is preferred, and by this means a good steady draught is obtained, and thus the vapour and mixed gases are enabled to be conveyed " to a con- " densing room, and thence to a tower filled with coke or bricks, " and to pass away the uncondensed products of the furnace either " direct into the open air or to a chimney."

[Printed 4*d*. No Drawings.]

A.D. 1866, November 27.—N° 3118.

CROCKFORD, Charles.—(*Provisional protection only.*)—" Improvements in obtaining useful products from certain materials " produced in the process of galvanizing or coating iron with " zinc." These are, in reference to this subject, as follows:—A solution is obtained by boiling "the material known as bath or " flux skimmings" in one or two waters and drain the liquor therefrom, and then "grind it in a wet state, and submit the " resulting paste-like mass to pressure," so as to obtain the whole of the soluble salts, sometimes omitting "the boiling as a treat- " ment preliminary to grinding." Treating the expressed liquor in one of the following ways:—1. "Precipitate the zinc with milk " of lime," avoiding an excess, and "then distil the liquor with " additional lime and obtain the ammonia therefrom," or, after precipitating the zinc, "add an equivalent of sulphate of ammonia, " and having boiled it down to dryness sublime the muriate of " ammonia." 2. "Precipitate the zinc with carbonate of soda " or sulphide of sodium," the precipitate pressed, and to the extracted liquor "is then added the proper equivalent of sulphate " of ammonia, and the resulting sulphate of soda is extracted " by boiling until its crystals are precipitated, or the whole is " boiled down to dryness, and the muriate of ammonia is sublimed " whilst the sulphate of soda remains in the subliming pot." 3. Precipitate the zinc with sulphide of barium, express the liquor from it, add an equivalent of sulphate of ammonia, the sulphate of baryta precipitated and the liquor expressed, and the muriate of ammonia crystallized or otherwise treated. 4. Add the proper equivalent of sulphate of ammonia, boil down to dryness, sublime the muriate of ammonia, and collect the sulphate of zinc from the subliming pot. 5. Precipitate the oxide of zinc with ammonia, express the liquor from it, muriate of ammonia in solution may be crystallized or otherwise. 6. Treating the whole of the skimmings with sulphuric acid, or the soluble salts extracted from them, as salt is treated in the manufacture of sulphate of soda; the muriatic acid is condensed, and the remaining sulphates of zinc and ammonia left are separated by sublimation after crystallizing or boiling down to dryness. Collecting and condensing the vapours from the galvanizing bath in a tower filled with coke in which water percolates, or other suitable condenser. The remainder of the Specification refers to the obtaining metallic zinc from substances produced in galvanizing iron.

[Printed, 4*d.* No Drawings.]

A.D. 1866, November 28.—Nº 3133.

LAKE, WILLIAM ROBERT.—(*A communication from William Bell, Thomas Mara Fell, and Ambrose George Fell.*)—" Improve-" ments in the manufacture of white lead." These are, first, " the production of a sulphate of lead," as follows:—Oxide of lead has about two and a half per cent. of nitric acid added to it, and sufficient water added to form a thin pasty mass, and sulphuric acid is gradually added with stirring, with more or less water to keep such mixture still in a thin pasty condition. Heat is evolved, nitric acid is liberated which attacks a fresh portion of oxide of lead, and from which nitric acid is again liberated by additional sulphuric acid, and the whole of the oxide of lead is converted into sulphate in this way. "The nitric acid may be " nearly all recovered after the formation of the sulphate by " subjecting the mass to the action of an hydraulic press; it may " also be recovered by gentle evaporation by means of heat in " pans or other vessels and then condensed."

Second. The treatment of the sulphate of lead obtained above as follows:—"To convert it into merchantable white lead." The sulphate is boiled in boilers or other vessels with about three per cent. of alkali, or with an alkaline compound which deprives it " of a portion of its acid and water," producing a new article; the product is next well washed, submitted to hydraulic pressure, and dried.

Third. The production of a precipitate termed "chloro-sulphate " of lead" as follows:—A solution is first made of about 10 parts of muriatic acid of 18° Baumè with 90 parts of sulphuric acid of 60 Baumè, adding more or less water, and this solution is gradually added to a solution of lead made by placing oxide of lead in nitric or acetic acids or other solvents, and stirring.

Fourth. "The treatment of this precipitate with an alkali or " with an alkaline compound." "Only a very small per-centage " of alkali need be used with this sulphate, causing a great saving " in alkali." It is stated that "this precipitate without the " alkali treatment is quite opaque or free from crystals," &c.,

and "may be used for the ordinary purposes to which white lead " is applied, but with such subsequent treatment a very superior " article is produced."

[Printed, 4d. No Drawings.]

A.D. 1866, December 3.—N° 3171. (* *)

MALLET, Jules Théodore Anatole. — "A process and " apparatus for producing jointly or separately oxygen and chlorine " from the same chemical substance and in the same apparatus." This consists as follows :—Sub-chloride of copper ($Cu^2 Cl$) is by the action of the oxygen of the air transformed into an oxychloride, which loses its oxygen at a dark red heat, passing again to the state of sub-chloride, and so forth. The apparatus are cylindrical cast-iron retorts coated with an enamel unattackable by chloride of copper, one, for instance, with base of borate, silicate, phosphate of copper, or any other which may be alike efficient. At the bottom of the retorts are plug-shut openings, and in the elongation of the figure axis there is an exit tube. The retorts are placed horizontally in a furnace and supported by a system of rollers, which allow of their rotation round their axis with the least possible friction.

"The oxichloride is mixed with 15 to 20 per cent. of inert " material, such as kaolin, porcelain, sand, or powdered fire-" bricks ; it is placed in the retort and never got out of it when " in regular working." When oxygen gas is alone required " the " heat minimum (dark red) is requisite. The oxygen gas evolved " passes through a washing vessel" and is collected. When gas has ceased to be evolved the retorts are cooled down and jets of water or steam are projected on it, and a draft of air is directed on it by a blower or pump, while rotating until the revivification of the material into oxychloride, which is effected in from two to three hours. If instead of " water or steam chlorhydric acid is in-" jected, either in the liquid state or at the state of vapor or gas, " and its action is combined with that of the air current ; or again " after the revivification has been effected, as for the oxygen, the " hydrochloric acid is added in either a liquid or gaseous state" with certain precautions, oxychloride and chloride of copper or chloride alone remains, liable on heating to yield oxygen and chlorine, the latter is absorbed by lime and the oxygen collected in a gasometer.

[Printed, 4d. No Drawings.]

A.D. 1866, December 4.—Nº 3180.

BONNEVILLE, Henri Adrien. — (*A communication from John Harvey Hebert.*)—(*Provisional protection only.*)—" Improve-" ments in the manufacture of white lead and in the vessels " connected therewith." These are, first, "litharge, the ores of " lead, crushed or roasted in the usual way, or metal lead reduced " to a fine condition or poured melting hot into cold water, are " used, so as to render the lead porous and bulky, in order to " increase as much as possible its surfaces, and either of these is " submitted to the dissolving action of the nitric or sulfuric " (sulphuric ?) acids or their equivalents, after which the sulfate " (sulphate?) of lead thus obtained is treated with pyroligneous " or oxalic acids, or such like acids, combined or not with tincal " or borax, or its equivalent, dissolved in water, and next dried " over the fire on trays or plates."

Second. The vessel or the vessels employed may be made of stone, resisting the action of the acids, but if wood or iron is used the inside of the vessel or vessels is lined with lead, which acquires a preservative covering of sulfate (sulphate?) of lead, and which in dissolving under the action of the acids adds to the mass of white lead being manufactured.

[Printed, 4*d*. No Drawings.]

A.D. 1866, December 6.—Nº 3212.

DE WISSOCQ, Paul Emile, and KRASINSKI, Louis.— " Improvements in the treatment of ores of metals of which the " sulphates are soluble in water." These are, first, obtaining " at a small cost by precipitation metallic oxides in a state of " great purity, that is to say, separated from earthy matter and " comparatively free from arsenic, antimony, phosphorous, and " other matters which injure the quality of the metal."

Second. "The employment of a furnace with a porous bed, " through which air or the vapour of water is passed, which in " permeating amongst the mineral placed upon the bed converts " the metal into sulphates, or in the employment of a rever-" beratory furnace with several beds placed the one above the " other." The employment of the vapour of water also when the minerals contain sulphuret of iron producing sulphate of iron, which again is decomposed, and yields an oxide of iron in a very fine state of division, which may be used in place of minium in painting, &c. The minerals are first roasted in one of the above furnaces to convert the metals into sulphates; if the minerals do not contain sufficient sulphur a sulphurous mineral is added, it may be iron pyrites; if the "mineral has not been completely " sulphated in the roasting," it is treated "with a little sulphuric " acid." The sulphate is dissolved in the roasted ore by water and transformed into "a hydrochlorate" either by adding "hy- " drochloride of soda," and submitting "the mixture to a cold of " 7 or 8 degrees below zero centigrade," the sulphate of soda formed crystallizes out; or by adding "hydrochloride or lime," sulphate of lime precipitates. "If the mineral produces several " sulphates, as in the case, for example, with suphuretted ores of " copper," "there will result a mixture of the hydrochlorates, " of which the oxides will precipitate, and may be collected " successively, according to the inverse order of their affinity for " the acid." In preference, oxide of iron is added to precipitate some of the oxides from the mixture of sulphates, and the solution remaining heavily charged with sulphate of iron is converted " into hydrochlorate, and then by means of lime oxide of iron " may be extracted."

[Printed, 8*d*. Drawing.]

A.D. 1866, December 6.—N° 3214.

WILLIAMSON, JOHN.—"Improvements in the manufacture of " alkalies." These are as follows:—"The vat liquors of black " ash contain iron in solution in the form of ferrocyanide of " sodium, which contaminates and discolors the products ob- " tained therefrom," are treated as follows, to "destroy this " compound, by heating the vat liquors under pressure in an iron " boiler capable of standing a high pressure, until they attain a " temperature of about three hundred and ten degrees (310°) " Fahrenheit, when the ferrocyanide is decomposed, and the iron " it contains is rendered insoluble, and can be separated by " settling or filtration. The same process is applicable to the " decomposition of ferrocyanide of potassium where potash is the " alkali under treatment." In preference the "liquor should be " of full strength," and the boiler cylindrical, "with hemisphe- " rical ends and without internal flues is the most convenient." " As soon as the pressure passes 80 lbs. on the square inch," samples are drawn and tested from time to time for ferrocyanide.

The liquor drawn from the boiler is allowed to settle or is filtered, and it is either evaporated for ash, or it is set to crystallize to obtain crystals of soda or of potash.

[Printed, 4*d*. No Drawings.]

A.D. 1866, December 7.—N° 3232. (* *)

GRAY, THOMAS.—" Improvements in the preparation of bleach-" ing materials or compounds." These are as follows :—It is stated that chloride of lime is usually employed for bleaching, and that unless the process is conducted carefully "there is a " risk of injuring or weakening the fabric or fibres submitted to " the action of the chlorine," and that "it is believed that this " arises from the presence of free acid in the bleaching com-" pound," which also retards the operation of bleaching. The object of this invention is "to eliminate this acid from the bleach-" ing compound or at any rate to neutralize it, so that even if the " acid be present it will be inert," as follows :—" Neutralizing the " free acid contained in bleaching compounds or chlorine gas by " passing the gas through an alkaline solution previous to bring-" ing it into contact with the lime with which it is to be com-" bined." It will be sometimes found more convenient to mix " soda ash, caustic soda, or other alkali in a solid but pulverized " state with the ground lime, so that when the chlorine gas is " brought into contact with the lime the free acid may be caused " to combine" with them, mixing about 2 ozs. of soda to one pound of lime. "As a modification of this latter process the " soda ash or other caustic alkali may be intimately mixed in a " pulverized state, in the proportions already stated, with the " bleaching powder or chloride of lime made in the ordinary " manner."

[Printed, 4*d*. No Drawings.]

A.D. 1866, December 13.—N° 3269.

BAGGS, ISHAM.—" Improvements in the manufacture and treat-" ment of hydrochloric and nitric acids." These are said to be, " the application of direct and supplementary heat" in the processes afterwards mentioned, and also "the application of refri-" geratory means for the rapid and effectual condensation of the " acid gases." "The recovery and direct utilization of the sul-" phuric acid employed" in the processes afterwards mentioned, and "the general arrangement and combination of the methods " and processes " afterwards mentioned, or " any mere modifica- " tions thereof."

The acid to be treated is put into a vessel which is heated or not, and is connected with a second vessel containing water, and this may be connected with a third vessel. The arrangement may be "a series of Woolff's bottles made of earthenware, stone- " ware, glass, or other suitable material." Into the vessel containing the acid sulphuric acid is poured, and the heat evolved causes the acid to distil over until the water in the second vessel "is " saturated, any escape of acid being taken up by the third vessel." The sulphuric acid is "concentrated by the application of heat, " as well known, by which means it may be used over and over " again for the same purpose as often as desired." The condensing vessels "are kept as cool as possible by surrounding them with " water or by other convenient or analogous means." "In cases " in which strength and not purity is the result desired, the second " and third vessels may contain the crude acid to be strengthened " in place of water." "The sulphuric acid, instead of being after- " wards concentrated as before mentioned, may be applied in a " direct manner to various useful purposes, as, for instance, to " the manufacture of salt cake." In place of "Woolff's bottles," " any analogous and suitable arrangement may be adopted in " which contact can be effected between the hydrochloric acid, " whether in the liquid or gasesous state, and the sulphuric acid, " in order to secure the absorption of the water by the latter."

[Printed, 4*d*. No Drawings.]

A.D. 1866, December 13.—Nº 3273.

BROOMAN, Clinton Edgecumbe.—(*A communication from Frederic Cordurié.*)—"Improvements in the treatment of lead and argentiferous litharge." These are, in reference to this subject, " the employment of superheated steam to oxidize the zinc and " separate it from the unattacked lead and silver, and the forced " passage of the oxides of zinc and litharge in fusion in a bath of " lead in order that they may abandon therein the silver which " they contain, " as follows:—The lead well melted is submitted for some time to an increased heat, after which are added "to " 100 parts of lead about 2 parts or more of zinc," stirring the whole well; the melted zinc taking possession of the silver rises to "the surface and begins" to "coagulate," when the alloy is removed from the bath; the last traces of zinc are removed by reheating the bath, covering it, and passing superheated steam into the lead by a pipe through the cover, the zinc oxidizes and floats and is removed, "the hydrogen which is disengaged may draw off "particles of oxides," which are collected in a condenser. "The "scummings containing lead, silver, and zinc cannot be com-"pletely freed from zinc by a simple distillation," moreover, silver is lost. A complete separation is best effected by oxidizing the zinc by a current of hot air or by preference by a jet of superheated steam admitted at a more or less considerable pressure, employing a condenser if required. The oxidized zinc, &c. are easily separated from the argentiferous lead in fusion by scumming or eliquation. The lead is cupelled, and the oxides after traversing a bath of lead in which they give off any silver are regenerated. "Argentiferous lead submitted to cupellation produces rich "litharge." The silver is removed from the litharge "by making "it traverse a bath of lead while the litharge is in fusion; the "litharge which floats on the top is marketable, and the lead "having become argentiferous is submitted to cupellation."

[Printed, 4*d*. No Drawings.]

A.D. 1866, December 20.—Nº 3359.

NORRINGTON, CHARLES.—"Improvements in the treatment "of substances containing phosphate of lime." These are, first, treating such substances with hydrochloric acid "so as to dissolve "both the carbonate and phosphate of lime, then precipitating "the phosphate of lime free from impurities in a highly concen-"trated form, and subsequently drying it by heat."

Second. Treating these substances "with hydrochoric acid, "using only sufficient for the solution, and removal thereby of "the carbonate of lime present without rendering the phosphate "soluble," as follows:—

The phosphatic substances, "coprolitic phosphates, apatite, bone "ash, phosphatic guanos, and other mineral phosphates," should be previously finely ground or pulverized, hydrochloric acid is added, regulated by the per-centage of carbonate and phosphate of lime contained in the substance, previously ascertained by analysis, but in the first case sufficient acid is added "to neutralize all the "carbonate of lime present, and further to dissolve the phosphate

" of lime;" the mixture after seven hours is thrown into a tank large enough "to hold a sufficient quantity of water to thoroughly " wash the mixture by agitation, and hold in solution the soluble " phosphate of lime," and the mixture is then washed with successive quantities of water. The solution having become clear by subsidence or filtration, "lime or soda, (caustic or the common " crystallized carbonate of soda or washing soda,)" but by preference lime, in the state of lime water or milk of lime is added, until the liquid ceases to give an acid reaction to litmus paper, the precipitate is allowed to settle, and the liquid allowed to run off the precipitate is washed and dried. In the second process the acid is added in sufficient quantity to act only on the carbonate of lime. In case by any possibility any phosphate was dissolved this solution is neutralized as above. The result is a substance, phosphate of lime of great purity, available for manure, phosphorus, and other manufacturers.

[Printed, 4*d*. No Drawings.]

A.D. 1866, December 28.—N° 3411.

CONDY, Henry Bollmann.—(*Provisional protection only.*)— " Improvements in the manufacture of chlorine and in prepara- " tions for evolving chlorine for disinfecting and other purposes." These are, employing "a mixture of permanganate of soda or " other soluble permanganate, common salt, or other soluble " chloride, and sulphuric acid." In preference a mixture is made consisting of, "say, 1½ pounds of common salt and one gallon " of permanganate solution of ordinary commercial strength; to " this preparation, when it is required for use, commercial sul- " phuric acid is to be added in the proportion of equal parts; on " this mixture being made chlorine is liberated," not suddenly, but gradually. "For manufacturing purposes the preparation " and process offer great facilities for obtaining small quantities " of chlorine in a nearly pure state."

[Printed, 4*d*. No Drawings.]

APPENDIX.

A.D. 1844, October 22.—N° 10,360.

RANSOME, Frederick.—" Improvements in the manufacture " of artificial stone for grinding and other purposes." These are in reference to this subject as follows :—Dissolving " 100 lbs. of " crystallized carbonate of soda, usually called sub-carbonate of " soda, or in commerce frequently termed merely soda, in about " 50 gallons of water," rendering " the carbonate of soda caustic " in the usual and well-known manner by means of lime ;" or instead of carbonate of soda employing " about 50 lbs. of car" bonate of potash, usually called pearlash, and the requisite " quantity of water," and rendering " it caustic by means of " lime." This caustic solution is reduced " to about 20 or 25 " gallons by heat," and digested in an iron vessel " with about " 100 pounds of broken flints or other convenient siliceous " mineral," " during 10 or 12 hours up to a pressure of about " 60 lbs. to the square inch, frequently stirring the mixture," any " undissolved stone " is removed by passing it through a suitable sieve.

This Specification is referred to in the Specifications of Letters Patent subsequently granted to the same patentee. See page 382 (No. 1666, A.D. 1853) and page 445 (No. 646, A.D. 1855).

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 6 (*enlarged series*), p. 41; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 307; Mechanics' Magazine, vol. 42, p. 441; Practical Mechanics' Journal, vol. 4, p. 273; Engineers' and Architects' Journal, vol. 8, p. 169; and Artizan, vol. 4, p. 100.]

A.D. 1849, November 28.—N° 12,867. (* *)

HILLS, Frank Clarke.—" An improved mode of compressing " peat for making fuel or gas, and of manufacturing gas, and of " obtaining certain substances applicable to purifying the same." These are in reference to this subject :—

First, the purifying coal gas from sulphuretted " hydrogen, " cyanogen, and more or less perfectly from ammonia by passing " it through the precipitated or hydrated oxides of iron, or the " sub-sulphates or oxychlorides of iron, from whatever source

" obtained, either by themselves, or, which is much better, made
" into a more porous material by being absorbed into or mixed
" with sawdust or breeze or peat charcoal in coarse powder, or
" other porous or absorbent material, so as to be readily permeable
" by the gas, and either used alone or mixed with sulphate
" of lime or sulphate or muriate of magnesia, potash, or soda, or
" in conjunction with any other purifying material at present in
" use for a similar purpose. But the peroxides of iron or manganese
" made at a red heat, or the oxide of iron mixed with
" chloride of calcium, or with the muriates and sulphates of
" manganese, iron, and zinc, and absorbed into sawdust, &c."
are not claimed.

Second, "repeatedly renovating or re-oxidizing the said purifying
" materials by the action of the air whenever they from
" time to time cease to absorb sulphuretted hydrogen, so that
" they may be used over and over again to purify the gas."

Third, "the collection of the ammonia or ammoniacal compounds
" given off from any purifying materials containing the
" said oxides, sub-sulphates, and oxychlorides, while being aired
" or renovated, either by the use of a condenser of any suitable
" description, or by combining the said ammonia or ammoniacal
" compounds with acids or water."

Fourth, "the collection of the sulphur, cyanogen, and ammoniacal
" compounds formed in the purifying materials during the
" process of purification and renovation."

Fifth, "making the oxides and sub-sulphates of iron from
" precipitated sulphurets of iron, by mixing such sulphurets with
" or absorbing them into sawdust or breeze, or other porous
" material, and then exposing the materials to the air to absorb
" oxygen."

[Printed, 1*s*. Drawing. See London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 26; Mechanics' Magazine, vol. 52, p. 436; vol. 65, p. 563; vol. 69, pp. 201 and 492; and vol. 1 (*new series*), p. 400; Patent Journal, vol. 9, p. 139; Exchequer Reports, vol. 9, p. 256; Law Journal (*Exchequer*), vol. 23 (*new series*), p. 60; and vol. 27 (*new series*), p. 60; Journal of Gas Lighting, vol. 3, p. 323; vol. 5, p. 671; vol. 6, pp. 196 and 585; vol. 7, pp. 451, 513, 631, and 658; vol. 8, pp. 330, 370, and 655; and vol. 9, pp. 116, 420, and 483.]

A.D. 1795, November 19.—N° 2075. (* *)

CARPENTER, Elias.—" A method of bleaching paper in the " water leaf or sheet, and sizing it without drying, whereby the " manufacture of it will be improved by shortning its process, " lessening its expence, and considerably increasing its value." This invention consists, first, in submitting paper in its " wet " state " to the action of the " vapor or steam " [chlorine gas] arising from the action of " vitriolic acid," " mixed with an equal " quantity of water, impregnated with the fumes of burning " sulphur " upon " manganese and salt," contained in a retort, heated by hot water in preference. The wet paper may be placed in frames in a box, suspended over slips of glass, and be exposed to the gas for eight or ten hours. The paper may then be sized with the following size :—" Take one hundredweight of pieces of " skins, of which size is usually made, and, after boiling it to a " due consistance and straining it, mix with it the following " ingredients, (vizt.) fourteen pounds weight of allum, seven " pounds of calcined vitriol, and one pound of gum arabic." The paper may then be pressed and finished in the usual way.

Secondly, " where the rag is of a course bad quality, abound- " ing with sheaves, it will require the following previous prepa- " ration." " I prepare a lixivium from equal quantities of pearl- " ash and quicklime, fresh from the kiln, the proportion of " about four pounds to each hundredweight of the article." " With this lixivium I either macerate my rag or boil it."

The patentee proposes to put alkali or lixivium on the bottom of the bleaching case, which will absorb the noxious vapor and make it less pernicious to the people employed, immediately on its being opened.

[Printed, *4d.* No Drawings. See Repertory of Arts, vol. 5. p. 369; Rolls Chapel Reports, 6th Report, p. 190.]

INDEX OF SUBJECT MATTER.

[The numbers refer to the pages in which the Abridgments commence. The names printed in *Italic* are those of the persons by whom the inventions have been communicated to the Patentees.]

Acetic acid, making or obtaining:

De Mayerne and Cademan, 3.
Bell, 34.
Hately, 46.
Shannon, 53.
Grace, 57.
Winsor, 65.
Winsor, 70.
Winsor, 71.
Winsor, 72.
Maas, 77.
Kneller, 81.
Vallance, 81.
Wilson, 85.
Warburton, 86.
Le Grand, 92.
Ham, 94.
Rigg, 96.
Ham, 97.
Young, 106.
Young, 107.
Sheridan, 112.
Sheridan, 113.
Simmons, 113.
Tealdi, 122.
Sheridan, 124.
Cronier, 160.
Troubat, 174.
Neale and Duyck, 179.
Drew and Stocker, 218.
Hills, 240.
Robertson, 251.
Solomons and Azulay, 263.
Barnes, 264.
Halliday, 267.
Wildsmith, 272.
Ecarnot, 282.
Stones, 285.
Tizard, 321.
Swindells and Nicholson, 334.
Watson and Slater, 339.
Condy, 345.
Muclow, 352.
Knab, 357.
Van Waesberghe, 389.
Challeton, 392.

Acetic acid, making or obtaining—*cont.*

Collins, 398.
Edwards, 398.
Poole, 399.
O'Malley, 400.
Condy, 401.
Condy, 414.
Plisson, 417.
Wray, 431.
Fontainemoreau, 432.
Horton, 448.
Gerraut, 475.
Pontifex, 480.
Barruel, 489.
Lucas and De Bridges, 496.
Clark, 507.
Deely, 516.
Gilbee, 516.
Walker, 522.
Zibelin, 528.
Richardson and Browell, 531.
Henry, 548.
Dubus, 552.
Hills, 566.
Manbré, 570.
Manbré, 578.
Lombard and Esquiron, 579.
Spilsbury, 580.
Lichtenstadt and Duff, 586.
Margesson, 588.
Smets, 602.
Garton, 607.
Newton (*Cooper*), 613.
Manbré, 627.
Smets, 632.
Manbré, 639.
Herbert, 641.
Lorberg, 658.
Wetter, 660.
Herbert (*Brumleu*), 663.
Jensen, 666.
Davies (*Carré*), 699.
Cobley, 718.
Liedeman and Lange (*Brumleu*), 725.
Mingaud, 732.
Stanford, 738.
Cobley, 745.

Acetic acid, making or obtaining—*cont.*
- Abel (*Rowland*), 757.
- Dédé, 762.
- Duncan, 774.
- Mennons (*Jouannet*), 778.
- Escharge, 792.
- Dickson, 793.
- Herapath, 804.
- Garton, 808.
- Trachsel and Clayton, 817.
- Garton, 830.
- Baggs and Simpson, 838.
- Lorberg, 852.
- Lee, 875.
- Smith (*Haeck*), 879.
- Boggio, 899.
- Burq, 914.
- Bennett, 930.
- Mingaud, 935.
- Newton (*Emery*), 944.
- Rowland, 986.

Acetic acid, substitute for:
- Baker, 673.

Acids, concentrating vessels, &c. for:
- Gibbins and Wilkinson, 91.
- Bury, 144.
- Kneller, 196.
- Gamble, 214.
- Barratt, 215.
- Jones, 232.
- Kurtz, 235.
- Hills, 240.
- Laming, 266.
- Hills, 268.
- Gossage, 301.
- Normandy and Fell, 308.
- Petrie, 338.
- Barlow, 350.
- Nesmond, 352.
- Vion, 357.
- Condy, 414.
- Collier, 416.
- Von Seckendorff, 433.
- Fontainemoreau, 437.
- Crockett, 497.
- Gossage, 519.
- Gossage, 521.
- Normandy, 594.
- Roberts and Dale, 594.
- Wagner, 609.
- Richardson, 639.
- Petrie, 692.
- Clapham, 695.
- Chenaillier, 782.
- Petrie, 786.
- Trachsel and Clayton, 817.
- Clark (*Verstraet and Schmidt*), 831.
- Clapham, 839.
- Davies (*Smith and Savage*), 876.

Acids, concentrating vessels, &c. for—*cont.*
- Cotelle, 877.
- Baggs and Simpson, 902.
- Clark (*Cotelle*), 908.
- Walsh, 925.
- Baggs, 1018.

Acids, &c., conveying, &c.:
- Oliver, 530.
- Ollivier, 637.

Acids, &c., purifying:
- Condy, 345.
- Barlow, 350.
- Nesmond, 352.
- Henderson, 354.
- Hunt, 385.
- Stenhouse, 491.
- Condy, 496.
- Spilsbury, 580.
- Cobley, 704.
- Lorberg, 728.
- Robertson, 752.
- Robertson, 753.
- Eschwege, 792.
- Herapath, 804.
- Boggio, 899.
- Burq, 914.
- Row, 917.

Acids, use of, in purifying gas:
- Croll, 172.
- Hills, 227.
- Croll, 265.
- Newton, 408.
- Laming, 427.
- Laming, 442.
- Gossage, 504.
- Wrightson, 643.
- Livesey, 787.
- Leigh, 825.
- Hills, 881.

Ærugo of copper. *See* Copper acetate.

Ærugo of iron. *See* Iron acetate.

Alkali residuum. *See* Calcium sulphide or sulphuret.

Alkalies, alkaline earths, and salts of, purifying gas with:
- Taylor, 84.
- Ledsam, 99.
- Wright, 101.
- Croll, 139.
- Croll, 172.
- Laming, 181.
- Cormack, 219.
- Constable, 222.

Alkalies, alkaline earths, &c.—*cont.*
Hills, 240.
Hills, 1022 (*Appendix*).
Laming and Evans, 286.
Barlow and Gore, 304.
Laming, 347.
Michiels, 350.
Souchon, 369.
Chisholm, 375.
Laming, 389.
Bowditch, 400.
Newton, 408.
Laming, 422.
Laming, 427.
Laming, 523.
Maltby, 538.
Spencer, 558.
Greenshields, 572.
Laming, 600.
Laming, 634.
Wrightson, 643.
Richardson, 685.
Stenhouse, 689.
Lorberg, 728.
Smith, 742.
Baggs and Simpson, 838.
Lorberg, 852.
Lorberg, 856.
Lorberg, 859.
Livesey, 936.
Lünge, 981.

Alkaloids and their salts, making and obtaining:
Warren, 97.
Pelletier and Desprez, 109.
Bullock, 237.
De Bassac, 380.
Herring, 384.
Thwaites and Herapath, 393.
Castets, 425.
De La Rue, 462.
Brooman (*Barry*), 591.
Clark (*De Sourdeval*), 626.
Brooman (*Paraf-Javal*), 960.
Paraf (*Paraf-Javal*), 992.

Allantoine:
Turner, 234.

Alum, making or obtaining:
Moore, 6.
Ward, 7.
Newton, 12.
Holme, Cropper, Nicholson, and Nicholson, 20.
Sanderson, 26.
King, 27.
Robinson, 39.
Dundonald, 42.
Dundonald, 52.
Winsor, 65.
Winsor, 70.

Alum, making or obtaining—*cont.*
Winsor, 71.
Winsor, 72.
Wilson, 85.
Gamble, 96.
Strachan, 100.
Wiseman, 160.
Hervey, 162.
Turner, 193.
Kagenbusch, 194.
Birkmyre, 212.
Cliff, 222.
Spence, 232
Wilson, 277.
Richardson, 283.
Spence, 298.
Wilson, 300.
Gossage, 301.
Barlow and Gore, 304.
Richardson, 313.
Laming, 325.
Aymard (*Saloman*), 366.
Richardson, 420.
Pochin, 440.
Frankland, 447.
Manning, 458.
Moll, 476.
Pochin, 479.
Spilsbury, 492.
Pease and Richardson, 512.
Metcalf, 513.
Baker, 525.
Clift, 544.
Croll, 577.
Bethell, 578.
Spence, 587.
Spence, 607.
Richardson, 664.
Robinson, 674.
Croll, 677.
West, 699.
Newton (*Le Chatelier*), 706.
Croll, 739.
Hughes and Richardson, 761.
Cleland, 768.
Spence, 829.
Armstrong, 844.
Croll, 927.

Alum, &c., freeing from iron:
Strahan, 100.
Wiseman, 160.
Hervey, 162.
Cliff, 222.
Hughes, 448.
Spence, 467.
Moll, 476.
Newton (*Rousseau Brothers and Morin*), 488.
Gedge (*Dauriac*), 489.
Metcalf, 513.
Croll, 577.
Newton (*Le Chatelier*), 619.
Bell, 649.

Alum, &c., freeing from iron—*cont.*
Newton (*Le Chatelier*), 707.
Richardson and Irvine, 750.
Noble, 800.
Dixon, 860.
Williamson, 1017.

Alum making, refuse from, use of:
Hallsworth and Platt, 852.

Alumina, making or obtaining:
Hervey, 162.
Tilghman, 248.
Gedge (*Dauriac*), 489.
Newton (*Le Chatelier*), 588.
Newton (*Le Chatelier*), 619.
Henderson and Down, 700.
Newton (*Le Chatelier*), 706.
Cobley, 745.
Gossage, 795.
Noble, 800.
Brooman (*Burnet*), 835.
Ward, 888.
Weldon, 987.

Alumina acetate, making or obtaining:
Hervey, 162.
Newton (*Le Chatelier*), 566.
Newton (*Le Chatelier*), 588.
Noble, 800.
Penney, 968.

Alumina chlorides:
Orioli, 636.
Routledge and Richardson, 933.

Alumina chromates. *See* Chromic acid.

Alumina fluosilicates. *See* Fluorine.

Alumina hypochlorides, or hypochlorites. *See* Alumina chlorides.

Alumina hyposulphates, hyposulphites, or sulphites:
Richardson, 664.
Walker, 806.

Alumina nitrate:
Cliff, 222.
Newton (*Le Chatelier*), 619.

Alumina phosphates:
Paul, 529.
Gerlaud, 765.

Alumina silicates:
Newton, 514.
Kenyon, 541.
Newton (*Le Chatelier*), 70
Ellis, 812.
Ellis, 945.

Alumina sulphate, making
obtaining:
Dundonald, 42.
Strachan, 100.
Wiesmann, 160.
Hervey, 162.
Birkmyre, 212.
Cliff, 222.
Spence, 232.
De Sussex, 252.
Spence, 298.
Wilson, 300.
Gossage, 301.
Barlow and Gore, 301.
Laming, 325.
Binks, 376.
Wilson, 391.
Moinier, 404.
Richardson, 420.
Pochin, 440.
Cuninghame, 446.
Frankland, 447.
Hughes, 448.
Manning, 458.
Richardson, 464.
Spence, 467.
Moll, 476.
Pochin, 479.
Gedge (*Dauriac*), 489.
Metcalf, 513.
Baker, 525.
Norris, 540.
Clift, 544.
Deacon, 555.
Croll, 577.
Spence, 587.
Newton (*Le Chatelier*), 588.
Spence, 607.
Newton (*Le Chatelier*), 619.
Croll, 677.
Newton (*Le Chatelier*), 706.
Croll, 739.
Richardson and Irvine, 750.
Cleland, 768.
Hills, 881.
Croll, 903.
Croll, 927.
Penney, 968.

Alumina and sulphur:
Hughes, 448.

Aluminium, making:
Knowles, 587.

Aluminium, making—*cont.*
- Corbelli (*Riatti*), 568.
- Monckton, 771.

Aluminium chloride, making or obtaining:
- Cliff, 222.
- De Sussex, 249.
- Newton (*Rousseau Brothers and Morin*), 488.
- Newton (*Le Chatelier*), 619.
- Richardson, 665.
- Henderson and Down, 700.
- Newton (*Le Chatelier*), 706.
- Noble, 800.
- Penney, 968.

Aluminates, making or obtaining:
- Tilghman, 248.
- Spilsbury, 485.
- Gedge (*Dauriac*), 489.
- Paul, 529.
- Newton (*Le Chatelier*), 619.
- Newton (*Le Chatelier*), 706.
- Cochran, 790.
- Gossage, 795.
- Noble, 800.
- Brooman (*Burnet*), 835.
- Dixon, 860.
- Johnson (*Bagneres*), 892.
- Penney, 968.
- Weldon, 1007.

Ammonia, making or obtaining:
- Dundonald, 28.
- Stone, 38.
- Crooks, 55.
- Winsor, 65.
- Winsor, 70.
- Winsor, 71.
- Winsor, 72.
- Taylor, 84.
- Wilson, 85.
- Simmons, 113.
- Linning, 129.
- Midgley and Kyan, 132.
- Dyar and Hemming, 138.
- Croll, 139.
- Watson, 146.
- Poole, 161.
- Phillippi, 184.
- Hompesch, 185.
- Newton, 188.
- Young, 189.
- Laming, 201.
- Watson, 206.
- Pollard, 207.
- Swindells, 209.
- Du Buisson, 223.
- Croll, 224.
- Hills, 227.
- Johnson, 233.
- Turner, 234.
- Hills, 240.
- De Sussex, 252.

Ammonia, making or obtaining—*cont.*
- Laming, 256.
- Hills, 268.
- Hills, 1022 (*Appendix*).
- Cowper, 280.
- Richardson, 283.
- Stones, 285.
- Laming and Evans, 286.
- Spence, 298.
- Newton, 316.
- Laming, 325.
- Ward, 333.
- Chisholm, 337.
- Watson and Slater, 339.
- Spieker, 383.
- Challeton, 392.
- Chisholm, 396.
- Brooman, 404.
- Hunt, 406.
- Newton, 408.
- Higgin, 413.
- Schloesing, 422.
- Johnson, 423.
- Laming, 427.
- Laming, 438.
- Leese, 440.
- Lodge and Marshall, 455.
- Ellis, 455.
- Gossage, 461.
- Deacon, 464.
- De Fonbone, 479.
- Brooman (*Barry*), 479.
- Balmain and Colby, 482.
- Firmin, 486.
- Owen, 498.
- Ellis, 490.
- Laming, 523.
- Hills, 561.
- Boulton, 567.
- Schloesing and Rolland, 569.
- Greenshields, 572.
- Roberts and Dale, 594.
- Possoz, 598.
- Spence, 607.
- Mennons (*De Siebenthal*), 613.
- Johnson (*Lucas*), 618.
- Greenshields, 631.
- Maumene and Rogelet, 633.
- Laming, 645.
- Hills, 650.
- Laming, 660.
- Clark (*Marguerritte and De Sourdeval*), 667.
- Senior and Slatter, 671.
- Manning, 675.
- Gélis, 690.
- Webster, 691.
- Chisholm, J. and G., and Kent, 703.
- Townsend, 713.
- Manning, 734.
- Clark (*Marguerritte and De Sourdeval*), 735.
- Stanford, 738.
- McArdle, 740.

Ammonia, making or obtaining—*cont.*
Brooman (*Leplay and Cuisinier*), 765.
Warlich, 767.
Cleland, 768.
Mouckton, 771.
Hutchinson, 781.
Brooman (*Pernolet*), 789.
Hutchinson, 804.
Coffey and Redwood, 805.
Hartley (*Hurwitz*), 822.
Lorberg, 833.
Lorberg, 852.
Clark (*Dusart and Gélis*), 854.
Lorberg, 856.
Lorberg, 859.
Laming, 863.
Solvay, 864.
Whitelaw, 871.
Newton (*Bang*), 909.
Christian, Charlton, and Charlton, 919.
Graham, 920.
Horton and Price, 922.
Clark (*Negret, Orioli, and Fredet*), 928.
Richardson and Rucker, 931.
Davey, 931.
Livesey, 936.
Dufrené (*Tellier*), 938.
Bernhard (*Lagrange*), 948.
Clark (*Negret, Orioli, and Fredet*), 950.
Bell, 959.
Sutton, 966.
Noone, 983.
Spence, 985.
Robinson, 1003.
Crockford, 1013.

Ammonia acetate:
Wyatt, 68.
Reece, 418.
Higgin, 463.
Bucholz, 698.
Lorberg, 728.
Stanford, 738.

Ammonia bi-carbonate, sub-carbonate, and sesqui-carbonate. *See* Ammonia carbonate.

Ammonia, bleaching with:
Crooks, 55.
Clark (*Negrot, Orioli, and Fredet*), 928.

Ammonia borates. *See* Boracic acid.

Ammonia carbonate, making and obtaining:
Taylor, 84.

Ammonia carbonate, making and obtaining—*cont.*
Savory, 85.
Dyer and Hemming, 122.
Waterton, 176.
Laming, 181.
Young, 189.
Beggs, 191.
Gregson, 215.
Cormack, 219.
Croll, 234.
Hills, 240.
Laming, 325.
Brown, 332.
Chisholm, 337.
Laming, 389.
Newton, 408.
Reece, 418.
Laming, 427.
Bellford, 448.
Dunlop, 458.
Gossage, 461.
Deacon, 464.
Balmain and Colby, 483.
Ellis, 490.
Clark (*Martin*), 597.
Laming, 600.
Clark (*Martin*), 602.
Laming, 645.
Robinson, 674.
Gélis, 690.
Clark (*Marguerittе and De Sourdeval*), 735.
Stanford, 738.
Robertson, 752.
Cleland, 768.
Mouckton, 771.
Robertson, 773.
Clark (*Margueritte and De Sourdeval*), 779.
Dickson, 793.
Hartley (*Hurwitz*), 822.
Laming, 863.
Solvay, 866.
Price (*Kunheim*), 940.

Ammonia and copper compounds:
Wyatt, 68.
Smith, 742.
Spence, 985.

Ammonia hydrocyanate. *See* Ammonium cyanides.

Ammonia hydrosulphate. *See* Ammonium sulphide or sulphuret.

Ammonia hyposulphite and sulphite, making or obtaining:
Poole, 161.
Laming, 325.

Ammonia hyposulphite and sulphite, making or obtaining—*cont.*
Hunt, 327.
Ward, 333.
Michiels, 350.
Newton, 408.
Hähner, 411.
Gossage, 504.
Spence, 546.
Townsend and Walker, 714.
Townsend and Walker, 721.
Clark (*Margueritte and De Sourdeval*), 735.
Cleland, 768.
Livesey, 787.

Ammonia nitrate and nitrite:
Croll, 139.
Watt, 309.
Petrie, 328.
Laming, 347.
Dunn, 435.
Dale, 465.
Lorberg, 728.
Monckton, 771.
Bernard (*Lagrange*), 943.

Ammonia oxalates. *See* Oxalates.

Ammonia phosphates:
Laming, 347.
Smith and McDougall, 402.
Laming, 438.
Maugham, 488.
Ritterbandt, 519.
Laming, 523.
Wrightson, 643.
Lightfoot, Barnes, and Lightfoot, 873.
Clark (*Lesieur*), 891.

Ammonia sesqui-carbonate. *See* Ammonia carbonate.

Ammonia and silica:
Ellis, 945.

Ammonia sulphate, making and obtaining:
Menish, 41.
Taylor, 84.
Croll, 159.
Poole, 161.
Bower, 169.
Croll, 172.
Young, 189.
Baggs, 191.
Watson, 206.
Barratt, 215.
Cormack, 219.
Radley, 220.
Constable, 222.

Ammonia sulphate, making and obtaining—*cont.*
Du Buisson, 223.
Hills, 227.
Dunlop, 251.
De Sussex, 252.
Wilson, 277.
Hills, 1022 (*Appendix*).
Richardson, 283.
Laming and Evans, 286.
Michiels, 289.
Barlow and Gore, 304.
Laming, 325.
Hunt, 327.
Pettitt, 329.
Ward, 333.
Chisholm, 375.
Spieker, 383.
De Bergevin (*Buran*), 386.
Laming, 389.
Chisholm, 396.
Edwards, 398.
Bowditch, 400.
Condy, 401.
Hunt, 406.
Laming, 438.
Laming, 442.
Balmain, 446.
Frankland, 447.
Lodge and Marshall, 455.
Bellford (*Kuhlmann*), 456.
Higgin, 463.
Laming, 475.
Gedge, 489.
Dauriac, 489.
Laming, 523.
Maltby, 538.
Spence, 546.
Bell, 551.
Hills, 561.
Boulton, 567.
Greenshields, 569.
Bethell, 578.
Wrightson, 643.
Brooman (*Demangeot and Co.*), 643.
Duncan, Scott, and Dawson, 656.
Wrightson, 666.
Robinson, 674.
Manning, 675.
Calvert, 693.
Townsend and Walker, 714.
Lorberg, 728.
Kernot and Rucker, 731.
Manning, 734.
Clark (*Margueritte and De Sourdeval*), 735.
McArdle, 740.
Robertson, 752.
Cleland, 768.
Monckton, 771.
Robertson, 773.
Hutchinson, 781.
Livesey, 787.
Croll, 791.
Fell, 798.

Ammonia sulphate, making and obtaining—*cont.*

Hutchinson, 804.
Coffey and Redwood, 805.
Marriott and Holroyd, 829.
Hartley (*Hurwitz*), 822.
Brooman (*Thibierge*), 828.
Baggs and Simpson, 838.
Laming, 863.
Forbes, 894.
Baggs and Simpson, 902.
Richardson and Rücker, 931.
Spence, 948.
Bell, 959.
Sutton, 966.
Crockford, 1013.

Ammonia sulphocarbonate:

Gélis, 690.

Ammonia supersulphate. *See* Ammonia sulphate.

Ammonia tannate. *See* Tannic acid.

Ammonia tartrates. *See* Tartaric acid.

Ammonia tungstate. *See* Tungstic acid.

Ammonia, use of in tawing:

Winsor, 65.
Winsor, 70.
Winsor, 71.
Winsor, 72.

Ammoniac, sal. *See* Ammonium chloride.

Ammonium chlorides, pots used in subliming:

Richards, W. and J., 941.

Ammonium chloride or muriate, making or obtaining:

Sedgwick, 14.
Stone, 38.
Menish, 41.
Dundonald, 42.
Dundonald, 44.
Dundonald, 52.
Crooks, 65.
Winsor, 65.
Wyatt, 68.
Winsor, 70.
Astley, 70.
Winsor, 71.
Winsor, 72.
Taylor, 84.
Warburton, 86.
Ledsam, 99.

Ammonium chloride or muriate, making or obtaining—*cont.*

Croll, 139.
Neville, 148.
Croll, 159.
Croll, 172.
Waterton, 176.
Philippi, 184.
Young, 189.
Laming, 201.
Denoon, 206.
Watson, 206.
Turner, 207.
Barratt, 215.
Gregson, 215.
Cormack, 219.
Hills, 1022 (*Appendix*).
Cormack, 284.
Petrie, 328.
Pettitt, 329.
Ward, 333.
Bellford, 336.
Chisholm, 337.
Laming, 347.
Spieker, 383.
De Bergevin, 386.
Buran, 386.
Chisholm, 396.
Bowditch, 400.
Hunt, 406.
Price, 422.
Schlœsing, 422.
Balmain, 446.
Dunlop, 453.
Lodge and Marshall, 455.
Bellford (*Kuhlmann*), 456.
Gossage, 461.
Dunlop, 471.
Ellis, 400.
Schmersahl, 532.
Maltby, 538.
Bell, 551.
Boulton, 567.
Schloesing and Rolland, 569.
Greenshields, 569.
Laming, 600.
Clark (*Martin*), 602.
Mennons (*De Siebenthal*), 613.
Wrightson, 643.
Graham, 644.
Robinson, 654.
Jossa, 657.
Wrightson, 666.
Calvert, 693.
Lorberg, 728.
Clark (*Marguerittte and De Sourdeval*), 735.
Stanford, 738.
McArdle, 740.
Robertson, 752.
Keernot and Rucker, 756.
Monckton, 771.
Robertson, 773.
Hutchinson, 781.

Ammonium chloride or muriate, making or obtaining—*cont.*
  Croll, 791.
  Hutchinson, 804.
  Coffey and Redwood, 805.
  Hunt, 808.
  Brooman, 828.
  Thibierge, 828.
  Webster, 858.
  Spence, 858.
  Laming, 863.
  Spence, 874.
  Clark (*Lesieur*), 891.
  Baggs and Simpson, 902.
  Newton (*Bang*), 909.
  Graham, 920.
  Richardson and Rücker, 931.
  Richards, W. and J., 941.
  Bell, 959.
  Sutton, 966.
  Noone, 985.
  Spence, 990.
  Crockford, 1013.

Ammonium cyanides, making or obtaining:
  Radley, 220.
  Hills, 227.
  Hills, 240.
  Stones, 285.
  Laming and Evans, 286.
  Losh, 321.
  Kirkham, J. and T. N., 324.
  Clark (*Marguerittte*), 841.

Ammonium ferro or ferricyanide, making or obtaining:
  Laming and Evans, 286.
  Gélis, 590.
  Brooman (*Baudesson and Housseau*), 907.
  Clark (*Marguerittte*), 841.

Ammonium sulphide or sulphuret, making or obtaining:
  Croll, 139.
  Radley, 220.
  Johnson, 233.
  Stones, 285.
  De Douhet, 291.
  Newton, 408.
  Laming, 427.
  Gossage, 504.
  Laming, 600.
  Laming, 645.
  Gélis, 690.
  Cleland, 768.
  Spence, 985.

Animal charcoal, preparing. *See* Carbon, preparing.

Aniline and its salts:
  Henry (*Obert, Vasseur, and Houbigant*), 679.
  Barrow, 759.
  Paraf (*Paraf-Javal*), 992.

Antichlores:
  Horsford, 417.
  Townsend and Walker, 714.
  Townsend and Walker, 721.
  Jullion, 800.

Antimoniates and antimonites:
  Spilsbury and Emerson, 463.

Antimonious acid. *See* Antimony oxides.

Antimony chlorides:
  Simpson and Foster, 278.
  Clark, 359.
  Henderson, 614.
  Henderson, 651.
  Ransford, 961.

Antimony oxides, making or obtaining:
  Barruel, 236.
  Todd, 284.
  Richardson, 319.
  Roberts, 334.
  Staite, 362.
  Henderson, 382.
  Henderson, 430.
  Dick, 597.
  Henderson, 615.
  Johnson (*Persoz*), 628.
  Hallett and Stenhouse, 720.
  Hallett and Stenhouse, 722.
  Smith, 742.
  Todd, 774.
  Glass, 777.
  Glass, 812.
  Brooman (*Burnet*), 835.

Antimony oxychloride or subchloride:
  Kirkham, J. and T. N., 324.

Antimony sulphate:
  Birkmyre, 258.
  Smith, 742.

Antimony sulphides or sulphurets, making or obtaining:
  Kirkham, J. and T. N., 324.
  Laming, 347.
  Clark, 359.
  Smith, 742.
  Brooman (*Burnet*), 835.

Antimony tungstate. *See* Tungstic acid.

Aqua regia:
- Clark (*Gaspard, Nathan, Orioli, Fredet, and Matussière*), 914.

Argol, substitute for:
- Bonney, 535.

Arseniates or arsenites, making or obtaining:
- Wyatt, 68.
- Mercer, 236.
- Birkmyre, 258.
- Mercer and Blythe, 280.
- Vivian, 311.
- Bellford, 336.
- Spilsbury and Emerson, 463.
- Dale, 465.
- Hähner, 480.
- Barcroft, 532.
- Henderson, 548.
- Roberts and Dale, 594.
- Emerson, 606.
- Gerland, 765.
- Lightfoot, Barnes, and Lightfoot, 873.
- Bankart, 953.
- Ensell, 963.

Arsenic acid, making and obtaining:
- Henderson, 382.
- Henderson, 430.
- Dale, 465.

Arsenic chlorides:
- Henderson, 430.
- Henderson, 614.
- Henderson, 651.
- Henderson and Downs, 700.

Arsenic sulphates:
- Henderson, 430.
- Smith, 742.

Arsenic sulphide or sulphuret:
- Blair and Watson, 170.
- Hunt, 385.
- Smith, 742.

Arsenious acid, making or obtaining:
- Murdock, 37.
- Sheffield, 78.
- Edwards and Williams, 81.
- Le Jeune, 187.
- Barlow, 281.
- Todd, 284.

Arsenious acid, making or obtaining—*cont.*
- Henderson, 382.
- Henderson, 430.
- Johnson (*Persoz*), 450.
- Bellford (*Kuhlmann*), 456.
- Baggs, 502.
- Oliver, 530.
- Johnson (*Persoz*), 628.
- Hallett and Stenhouse, 720.
- Jones, 725.
- Smith, 742.
- Clark (*Vorstraet and Schmid*), 831.
- Polkinghorne, 833.
- Gerstenhöfer, 855.
- Bankart, 953.
- Pengilly, 962.
- Todd, 967.
- Marçais, 989.

Baking powder:
- Newton (*Horsford*), 485.
- Newton (*Horsford*), 501.
- Johnson (*Pollok*), 876.

Barilla, making. *See* Soda carbonate.

Barium chloride, making or obtaining:
- Wyatt, 68.
- Watt and Tebbutt, 135.
- Croll, 159.
- De Sussex, 249.
- De Sussex, 252.
- Condy, 345.
- Elliot, 414.
- Bellford (*Kuhlmann*), 456.
- Clark, 507.
- Symonds, 523.
- Henderson, 548.
- Emerson, 606.
- Greenshields, 631.
- Richardson and Prentice, 662.
- Seitz, 691.
- Newton (*Le Chatelier*), 706.
- Bischof, 773.
- Brooman (*Burnet*), 835.
- Newton (*De Massy, L. P. R. and L. R.*), 878.
- Price (*Kunheim*), 940.
- Robinson, 956.

Barium cyanide:
- Clark (*Margueritte and De Sourdeval*), 667.
- Clark (*Margueritte and De Sourdeval*), 670.
- Chisholm, Chisholm, and Kent, 703.
- Clark (*Margueritte and De Sourdeval*), 726.
- Clark (*Margueritte*), 841.

Barium ferri or ferrocyanide:
- Clark (*Margueritte and De Sourdeval*), 726.
- Robinson, 956.

Barium sulphide or sulphuret, making or obtaining:
- Dundonald, 44.
- Woolrich, 120.
- Samuel, 145.
- De Douhet, 291.
- Speuce, 298.
- Taylor, 303.
- Kuczynski, 418.
- Hughes, 448.
- Johnson (*Tassy de Montluc and Gautier*), 494.
- Willans, 626.
- Greenshields, 631.
- Newton (*Le Chatelier*), 706.
- Clark (*Margueritte and De Sourdeval*), 726.
- Cobley, 746.
- Brooman (*Delaune*), 776.
- Verstraet and Olivier, 802.
- Brooman (*Burnet*), 835.
- Newton (*De Massy, L. P. R. and L. R.*), 878.
- Lunge, 981.
- Robinson, 1003.

Baryta (hydrate or caustic), making or obtaining:
- Fuller, 89.
- Watt and Tebbutt, 135.
- Samuel, 145.
- Hills, F. and G., 183.
- Tilghman, 248.
- Taylor, 303.
- Kuczynski, 418.
- Clapham, 447.
- Bellford (*Kuhlmann*), 456.
- Tilghman, 458.
- Clark, 508.
- Henderson, 548.
- Seymour (*Le Play*), 611.
- Willans, 626.
- Greenshields, 631.
- Clark (*Margueritte and De Sourdeval*), 667.
- Church, 770.
- Brooman (*Delaune*), 776.
- Brooman (*Burnet*), 835.
- Heusner, 843.
- Newton (*De Massy, L. P. R. and L. R.*), 878.
- Davies (*Rémond*), 979.
- Robinson, 1003.

Baryta acetates, making or obtaining:
- Condy, 345.
- Kuczynski, 418.
- Johnson (*Tassy de Montluc and Gautier*), 494.

Baryta acetates, making or obtaining—*cont.*
- Clark, 507.
- Buchholz, 698.

Baryta aluminates. *See* Aluminates.

Baryta arseniate or arsenite. *See* Arseniates.

Baryta carbonate, making or obtaining:
- Dundonald, 44.
- Wyatt, 68.
- Woolrich, 120.
- Croll, 159.
- Cormack, 219.
- Taylor, 303.
- Kuczyuski, 418.
- Ransome, 432.
- Johnson (*Tassy de Montluc and Gautier*), 494.
- Clark, 507.
- Emerson, 606.
- Seymour (*Le Play*), 611.
- Greenshields, 631.
- Clark (*Margueritte and De Sourdeval*), 726.
- Clark (*Margueritte and De Sourdeval*), 735.
- Brooman (*Delaune*), 776.
- Brooman (*Burnet*), 835.
- Heusner, 843.
- Robinson, 956.
- Lunge, 981.

Baryta chlorate. *See* Baryta chloride.

Baryta chloride:
- Tennant, 51.
- Tennant, 54.
- Watt, 309.
- Brooman (*Burnet*), 835.

Baryta borate. *See* Boracic acid.

Baryta citrate. *See* Citric acid.

Baryta fluosilicate. See Fluorine.

Baryta hypochlorite. *See* Baryta chloride.

Baryta hyposulphate, hyposulphite, and sulphite:
- Redwood, 678.
- Seitz, 691.
- Brooman (*Burnet*), 835.
- Robinson, 956.

Baryta manganate. *See* Manganates.

Baryta nitrates and nitrites, making or obtaining:
Crane and Jullien, 260.
Watt, 309.
Price, 330.
Condy, 345.
Bellford (*Kuhlmann*), 456.
Brooman (*Burnet*), 835.
Clark (*Dehaut*), 952.

Baryta oxalates. *See* Oxalates.

Baryta phosphates, making or obtaining:
Henderson, 548.
Emerson, 606.
Clark (*Margueritte and De Sourdeval*), 736.

Baryta, saccharates:
Seymour (*Le Play*), 611.

Baryta silicate, making or obtaining:
Balmain and Parnell, 275.
Ransome, 432.
Johnson (*Tassy de Montluc and Gautier*), 494.
Henderson, 548.
Cobley, 744.
Cobley, 745.
Church, 770.

Baryta sulphate, making or obtaining:
Fuller, 89.
Duesbury, 96.
Samuel, 145.
Jullien, 243.
De Douhet, 291.
Claussen, 316.
Price, 330.
Condy, 345.
Oliver, 363.
Ransome, 432.
Clapham, 447.
Hughes, 448.
Coulson, 454.
Bellford (*Kuhlmann*), 456.
Moll, 476.
Balmain and Colby, 483.
Clark, 507.
Henderson, 548.
Emerson, 606.
Greenshields, 631.
Nixon, 661.
Clark (*Margueritte and De Sourdeval*), 667.

Baryta sulphate, making or obtaining—*cont.*
Clark (*Margueritte and De Sourdeval*), 670.
Redwood, 678.
Seitz, 691.
Newton (*Le Chatelier*), 706.
Clark (*Margueritte and De Sourdeval*), 726.
Church, 770.
Bischof, 773.
Duncan, 774.
Verstraet and Olivier, 802.
Brooman (*Burnet*), 835.
Newton (*De Massy, L.P. R. and L. R.*), 878.
Hunter, 909.
Chaudet, 939.
Price (*Kunheim*), 940.
Robinson, 956.
Lange, 981.
Crockford, 1018.

Baryta stannate. *See* Stannates.

Baryta tartrate. *See* Tartaric acid.

Baryta tungstate. *See* Tungstic acid.

Bay salt. *See* Common salt.

Benzine. *See* Benzole.

Benzoic acid and benzoates:
Murdoch, 346.
Laurent and Casthelaz, 915.
Laurent and Casthelaz, 934.

Benzole:
Henry (*Obert, Vasseur, and Houbigant*), 679.
Townsend, 713.
Barrow, 759.
Leigh, 825.
Montie, 897.

Bismuth oxides:
Roberts, 334.
Cobley, 745.
Brooman (*Burnet*), 835.

Bismuth sulphides:
Brooman (*Burnet*), 835.

Blast furnaces, heat from, use of. *See* Heat from blast furnaces, &c.

Boracic acid and borates, making or obtaining:
- Delahaute, 80.
- Sautter, 198.
- Barlow and Gore, 304.
- Murdoch, 346.
- Hardinge, 397.
- Kuczynski, 418.
- Bell and Schofield, 426.
- Margueritte, 437.
- Richardson, 469.
- Beatson, 473.
- Gilbee, 584.
- Walker, 806.
- Ellis, 812.
- Brooman (*Kestner*), 925.

Borax. *See* Boracic acid.

Bromine or bromides, making or obtaining:
- Reade, 244.
- Theroulde, 598.
- Newton (*Le Chatelier*), 619.
- McArdle, 740.
- Dickson, 793.
- Readman, 829.
- Leisler, 910.
- Paraf, 1003.
- Wanklyn, 1003.

Butyric acid:
- Pontifex, 480.

Cadmium and its salts or compounds:
- Clark, 359.
- Titterton, 487.
- Titterton, 506.
- Price, 571.

Calcium chloride, making or obtaining:
- Birnie, 35.
- Dundonald, 44.
- Wyatt, 68.
- Ledsam, 99.
- Wright, 101.
- Gossage, 130.
- Fowler, 143.
- Croll, 159.
- Pattinson, 176.
- Gregson, 216.
- De Sussex, 252.
- Laming, 256.
- Laming and Evans, 286.
- Liebhaber, 300.
- Oliver, 363.
- Condy, 401.
- Elliot, 415.
- Price, 422.
- Bell and Scholfield, 426.
- Shanks (*Von Seckendorf*), 429.

Calcium chloride, making or obtaining—*cont.*
- Margueritte, 435.
- Dunlop, 453.
- Favre, 454.
- Dunlop, 471.
- Clark, 507.
- Symonds, 523.
- Henderson, 548.
- Clark (*Martin*), 593.
- Clark (*Martin*), 597.
- Emerson, 600.
- Mennons (*De Siebenthal*), 613.
- Brooman (*Demangeot and Co.*), 643.
- Richardson and Prentice, 662.
- Binks and Macqueen, 672.
- Cobley, 710.
- Liedeman and Lunge, 725.
- Brumlen, 725
- Wilson and Tatters, 742.
- Noble, 743.
- Oliver, Grantham, Sinnock, and Leverson, 754.
- Bischof, 773.
- Lepainteur, 823.
- Henderson, 824.
- Brooman (*Burnet*), 835.
- Clapham, 839.
- Crockford, 849.
- Jones, 864.
- Clark (*De Tregomain*), 872.
- Clark (*Lesieur*), 891.
- Leverson (*Oliver*), 913.
- Laurent and Casthelaz, 914.
- Schaffner, 948.

Calcium cyanides or ferro or ferri-cyanides, making or obtaining:
- Firmin, 486.
- Hutchinson, 781.
- Clark (*Margueritte*), 841.

Calcium fluorides. *See* Fluorine.

Calcium sulphide or sulphuret, making, obtaining, or using:
- Wright, 101.
- Lowe, 107.
- Leighton, 116.
- Spence, 121.
- Gossage, 130.
- Fowler, 143.
- Blair and Watson, 170.
- Hills, F. and G., 183.
- Napier, 214.
- Barratt, 215.
- Smith, 229.
- Lowe, 238.
- Ward, 238.

Calcium sulphide or sulphuret, making, obtaining, or using —*cont.*

- Hills, 268.
- Balmain and Parnell, 275.
- De Douhet, 291.
- Gossage, 293.
- Spence, 298.
- Hills, 314.
- Losh, 324.
- Gossage, 344.
- Bell, 345.
- Laming, 347.
- Aspdin, 351.
- Robb, 364.
- Robb, 366.
- McDougall, 378.
- Shanks, 380.
- Pattinson, 385.
- Bell, 388.
- Schwabe, 420.
- Balmain, 446.
- Favre, 454.
- Lozano, 468.
- Clark, 507.
- Laming, 523.
- Gossage, 526.
- Gossage, 546.
- Gossage, 550.
- Blair, 564.
- Gossage, 591.
- Gossage, 595.
- Gossage, 608.
- Spencer, 614.
- Wrightson, 643.
- Hunter, 676.
- Arrott, 681.
- Townsend and Walker, 687.
- Townsend and Walker, 714.
- Townsend and Walker, 721.
- Jullien, 724.
- Wilson and Tatters, 742.
- Noble, 743.
- Haeffely, 748.
- Dickson, 793.
- Jullien, 800.
- Verstraet and Olivier, 802.
- Schnell (*Mond*), 803.
- Ward, 810.
- Bath, 816.
- Marriott and Holroyd, 820.
- Clapham, 839.
- Clapham, 844.
- Mond, 853.
- Lorberg, 859.
- Jones, 864.
- Jones, 878.
- Jones, 884.
- Schaffner, 948.
- Hofmann, 978.
- Spence, 985.
- Bousfield (*Hofmann*), 1005.

Calomel. *See* Mercury chlorides.

Carbolic acid and salts. *See* Phenic acid and salts.

Carbon, making or obtaining:

- Dundonald, 28.
- Winsor, 65.
- Winsor, 70.
- Winsor, 71.
- Winsor, 72.
- De Berenger, 78.
- Taylor, 84.
- Newton, 203.
- Binks, 230.
- Michiels, 289.
- Barlow and Gore, 304.
- Chisholm, 337.
- Gautier, 347.
- Knab, 357.
- Gwynne, J. and J. E. A., 395.
- Chisholm, 396.
- Coste, 412.
- Horton, 448.
- Stenhouse, 491.
- Owen, 498.
- Galy-Cazalet and Huillard, 543.
- Lichtenstadt and Duff, 586.
- Duncan, Scott, and Dawson, 656.
- Lorberg, 658.
- Hunt, 669.
- Manning, 675.
- Calvert, 693.
- Townsend, 712.
- Lorberg, 728.
- Stanford, 738.
- Robertson, 752.
- Morris, Weare, and Monckton, 753.
- Brooman (*Le Play and Cuisinier*), 765.
- Joseph, 772.
- Robertson, 773.
- Brooman (*Le Play and Cuisinier*), 796.
- Clark (*Marguerite*), 841.
- Lorberg, 852.
- Lorberg, 856.
- Tooth, 868.
- Lee, 875.
- Clark (*Archereau*), 886.
- Moride, 906.

Carbon chlorides, making or obtaining:

- Simpson and Foster, 278.
- Ransford, 961.
- Crump, 966.

Carbon sulphide or sulphuret, making or obtaining

- Galy-Cazalet and Huillard, 543.
- Stenhouse, 689.
- Brooman (*Burnet*), 835.
- Davy, 981.

Carbonic acid, making, obtaining, or using :
- Dundonald, 44.
- Fuller, 89.
- Attwood, 90.
- Woolrich, 120.
- Sewell, 128.
- Maugham, 130.
- Button and Dyar, 132.
- Dyar and Hemming, 138.
- Sewell, 139.
- Fowler, 143.
- Cory, 144.
- Smith, 174.
- Sewell, 179.
- Baggs, 191.
- Graham, 201.
- Gregson, 215.
- Hills, 227.
- Hills, 240.
- Fourmentin, 253.
- Richardson, 265.
- Laming and Evans, 286.
- Liebhaber, 300.
- Watt, 309.
- Graham, 318.
- Watson and Slater, 339.
- Newton, 343.
- Werckshagen, 358.
- Robb, 366.
- Richardson, 378.
- Taylor, 387.
- Condy, 401.
- Chenot, 405.
- Schloesing, 422.
- Johnson, 423.
- Fontainmoreau, 437.
- Laming, 442.
- Bellford, 443.
- Johnson (*Persoz*), 450.
- Deacon, 464.
- Stott, 465.
- Laming, 475.
- Barrow, 477.
- Balmain and Colby, 483.
- Newton (*Horsford*), 485.
- Johnson (*Tassy de Montluc and Gautier*), 494.
- Newton (*Horsford*), 501.
- Fontainemoreau, 509.
- Gossage, 526.
- Galy-Cazalet and Huillard, 543.
- Blair, 564.
- Schloesing and Rolland, 569.
- Greenshields, 572.
- Crockford, 580.
- Brown and Young, 583.
- Gossage, 591.
- Gossage, 595.
- Clark (*Martin*), 597.
- Dauglish, 603.
- Gossage, 608.
- Wilson, 629.
- Arrott, 629.
- Medlock, 637.
- Laming, 645.

Carbonic acid, making, obtaining, or using—*cont.*
- Gossage, 646.
- Blair, 655.
- Hunt, 669.
- Bower, 677.
- Keates, 681.
- Johnson (*Ozouf*), 688.
- Cobley, 704.
- Hunt, 705.
- De Melcy, 735.
- Clark (*Margueritte and De Sourdeval*), 735.
- Oliver, Grantham, Sinnock, and Leverson, 754.
- Brooman (*Auburtin*), 760.
- Clark (*Margueritte and De Sourdeval*), 779.
- Verstraet and Olivir, 802.
- Johnson (*Macfarlane*), 826.
- Morel, 834.
- Brooman (*Burnet*), 835.
- Clemm, 845.
- Tooth, 868.
- Clark (*Achereau*), 886.
- Ward, 888.
- Ozouf, 891.
- Tooth, 893.
- Newton (*Bang*), 909.
- Price, 911.
- Christian, Charlton, and Charlton, 919.
- Bowditch, 922.
- Hunter, 927.
- Livesey, 936.
- Bernhard (*Lagrange*), 943.
- Mott, 952.
- Lunge, 981.
- Rowland, 986.
- Newton (*Baker, Poole, and Stace*), 998.

Catechuic acid. *See* Tannic acid.

Ceruse. *See* Lead carbonate.

Chalk burning. *See* Lime making.

Chemical works, fumes from :
- Atkinson, 510.
- Gurlt, 943.

Chinoidine. *See* Alkaloids.

Chlorine, making or obtaining :
- De Boneuil, 36.
- Taylor, C. and G., 39.
- Campbell, 42.
- Bigg, 43.
- Dundonald, 44.
- Carpenter, 1024 (*Appendix*).
- Tennant, 51.
- Tennant, 54.

Chlorine, making or obtaining—*cont.*
- Crooks, 55.
- Morfitt, 101.
- Wright, 101.
- Young, 107.
- Tennant and Clark, 109.
- Maugham, 114.
- Gossage, 130.
- Watt and Tebbutt, 134.
- Watt and Tebbutt, 135.
- Binks, 149.
- Gamble, 154.
- Lee, 185.
- Seybel, 192.
- Walters, 197.
- De Sussex and Arrott, 211.
- Oxland, 217.
- Radley, 220.
- Longmaid, 226.
- Pattinson, 239.
- Jullien, 243.
- Longmaid, 246.
- De Sussex, 249.
- Dunlop, 251.
- Longmaid, 256.
- McDougal and Rawson, 269.
- Collins, 270.
- Watt, 309.
- Pattinson, 319.
- Swindells and Nicholson, 334.
- Robb, 366.
- Binks, 376.
- Boyd, 377.
- Glover, 379.
- Cormack, 381.
- Bell, 388.
- Lister, 400.
- Hahner, 411.
- Higgin, 413.
- Balmain, 446.
- Dunlop, 453.
- Gossage, 461.
- Thibierge, 467.
- Dunlop, 471.
- Barrow, 473.
- Barrow, 477.
- Monod, 501.
- Muspratt and Gerland, 511.
- Muspratt and Gerland, 536.
- Burnett, 542.
- Gatty, 545.
- Newton (*Le Chatelier*), 588.
- Shanks, 590.
- Roberts and Dale, 594.
- Robinson, 654.
- Laurens, 655.
- Binks and Macqueen, 672.
- Hunter, 676.
- Binks, 683.
- Wheeler, 695.
- Clapham, 695.
- Townsend and Walker, 714.
- Binks, 717.
- Oliver, Grantham, Sinnock, and Leverson, 754.

Chlorine, making or obtaining—*cont.*
- Baggs and Simpson, 785.
- Binks, 786.
- Dickson, 793.
- Dickson, 801.
- Hunt, 808.
- Binks, 820.
- Johnson (*Macfarlane*), 825.
- Clapham, 839.
- Clark (*De Trégomain*), 872.
- Baggs and Simpson, 902.
- Henderson, 929.
- Routledge and Richardson, 933.
- Dufrené (*Tellier*), 938.
- Deane, 974.
- Weldon, 997.
- Clark (*Cotelle*), 1000.
- Rowbotham, 1001.
- Hughes (*Large*), 1001.
- Neill and Smith, 1004.
- Claudet, 1009.
- Seitz, 1011.
- Mallet, 1015.
- Gray, 1018.
- Condy, 1021.

Chlorine residues, use of:
- Wilson, 146.
- Binks, 149.
- Laming, 256.
- Binks, 376.
- Glover, 379.
- Hunt, 436.
- Balmain, 446.
- Dunlop, 453.
- Bellford (*Kuhlmann*), 475.
- Dunlop, 471.
- Elliot and Patinson, 484.
- Elliot, 503.
- Cook, 505.
- Clark, 507.
- Muspratt and Gerland, 511.
- Muspratt and Gerland, 536.
- Blair, 564.
- Haeffely, 584.
- Gossage, 595.
- Gossage, 608.
- Laming, 634.
- Dales, 640.
- Hunter, 676.
- Townsend and Walker, 687.
- Seitz, 691.
- Townsend and Walker, 714.
- Mease, 719.
- Haeffely, 748.
- Walker, 806.
- Hunt, 808.
- Henderson, 823.
- Johnson (*Macfarlane*), 825.
- Clapham, 839.
- Crockford, 849.
- Mond, 853.
- Deane, 974.
- Hofmann, 978.

Chlorine residues, use of—*cont.*
Lunge, 981.
Weldon, 997.
Clark (*Cotelle*), 1000.
Bousfield (*Hofmann*), 1005.

Chrolithineum :
Emerson, 624.

Chromates, use of :
Hills, 240.

Chromic acid or chromates, making or obtaining :
Tilghman, 247.
Tilghman, 248.
Swindells, 290.
Watson and Slater, 339.
Booth, 343.
Clark, 359.
Stacti, 362.
Fontainemoreau, 437.
Gilbee, 584.
Shanks, 590.
Newton (*Mayer*), 650.
Poussier, 691.
Stuart, 692.
Cobley, 718.
Tolhausen (*Rousse*), 731.
Abel, 780.
Taillandier, 780.
Ellis, 812.
Powers and Dale, 825.
Thornthwaite, 867.
Ward, 885.
Ward, 888.
Leather (*Margulies*), 899.
Leather (*Margulies*), 904.
Leather (*Margulies*), 912.
Dentith, 932.
Chaudet, 939.
Clark (*Dehaut*), 952.
Brooman (*Maréchal and Tessie du Motay*), 964.
Davis, 973.

Chromium oxides :
Gilbee, 584.
Shanks, 590.
Stuart, 692.
Cobley, 745.
Brooman (*Kestner*), 925.
Chaudet, 939.
Clark (*Dehaut*), 952.

Citric acid and citrates :
Price, 330.
Poole, 399.
Pontifex, 480.
Pontifex and Ogston, 503.
Firmin, 813.
Row, 917.

Cobalt arseniates, arsenites, arsenides, or arsenurets. *See* Arseniates.

Cobalt benzoate. *See* Benzoic acid.

Cobalt borate. *See* Boracic acid.

Cobalt carbonate :
Muspratt and Gerland, 533.

Cobalt chlorides :
Henderson, 614.
Henderson, 651.
Dahl, 665.
Dawn, 730.
Gerland, 788.

Cobalt nitrates :
Clark, 359.
Down, 730.

Cobalt oxalate. *See* Oxalates.

Cobalt oxides :
Clark, 359.
Bellford (*Kuhlmann*), 456.
Newton, 537.
Henderson, 614.
Henderson, 651.

Cobalt resinate :
Murdoch, 346.

Cobalt sulphates :
Henderson, 651.
Dahll, 665.
Down, 730.
Claudet, 1009.

Cobalt sulphides :
Muspratt and Gerland, 511.
Muspratt and Gerland, 530.
Cobley, 710.
Claudet, 1009.

Codeia. *See* Alkaloids.

Coke ovens, heat from. *See* Heat from blast furnaces, &c.

Cold, producing :
Davies (*Carré*), 699.
Reece, 949.
Brooman (*Paraf-Javal*), 960.
Severn, 974.
Paraf (*Paraf-Javal*), 992.

Condensing chambers :
Wright, 101.
Church, 102.

Condensing chambers—*cont.*

- Phillips, 105.
- Lutwyche, 123.
- Gossage, 125.
- Gossage, 130.
- Gamble, 154.
- Rowe, 155.
- Jefferies, 156.
- Hunt, 164.
- Blair and Watson, 170.
- Harvey, 172.
- Laming, 181.
- Philippi, 184.
- Duclos de Boussois, 189.
- Young, 189.
- Stagg, 202.
- Newton, 203.
- Turner, 207.
- Lee, 208.
- Turner, 210.
- Radley, 220.
- Hills, 227.
- Bell, 231.
- Gossage, 232.
- Bell, 239.
- Hills, 240.
- Jullion, 243.
- Rochaz, 259.
- Crane and Jullion, 260.
- Hills, 268.
- Wilson, 277.
- Cowper, 280.
- Barlow, 281.
- Ecarnot, 282.
- Todd, 284.
- Protheroe, 290.
- Newton, 295.
- Scott, 296.
- Wilson, 300.
- Newton, 316.
- Tizard, 321.
- Roberts, 323.
- Hunt, 327.
- Petrie, 338.
- Gossage, 344.
- Barlow, 350.
- Watson, 354.
- Henderson, 354.
- Hunt, 385.
- Watson, 387.
- Hunt, 406.
- Hähner, 411.
- Plisson, 417.
- Reece, 418.
- Johnson, 423.
- Hunt, 424.
- Schmersahl and Bouck, 439.
- Petrie, 449.
- Johnson (*Persoz*), 450.
- Favre, 454.
- Atkinson, 455.
- Bellford (*Kuhlmann*), 456.
- Gossage, 461.
- De Fonbone, 479.
- Gossage, 484.
- Titterton, 485.
- Firmin, 486.
- Titterton, 487.
- Radley, 492.
- Gossage, 519.
- Gossage, 521.
- Gossage, 526.
- Oliver, 530.
- Gossage, 550.
- Spence, 607.
- Henderson, 614.
- Johnson (*Persoz*), 623.
- Bell, 649.
- Richardson and Prentice, 662.
- Petrie, 692.
- Clapham, 695.
- Buchholz, 698.
- Henderson and Down, 700.
- Cobley, 710.
- Jones, 725.
- Clark (*Margueritte and De Sourdeval*), 735.
- Johnson (*Muller*), 762.
- Brooman (*Pernolet*), 789.
- Ogston, 819.
- Johnson (*Macfarlane*), 826.
- Humby (*Felsch*), 830.
- Clark (*Verstraet and Schmid*), 831.
- Bousfield (*Elmer*), 832.
- Polkinghorne, 833.
- Clapham, 839.
- Bennett, 841.
- Solvay, 866.
- Darlington, 873,
- Cotelle, 877.
- Boggio, 869.
- Baggs and Simpson, 902.
- Clark (*Negret, Orioli, and Fredet*), 928.
- Henderson, 929.
- Lockey, 942.
- Gurlt, 943.
- Reece, 949.
- De Sinçay, 956.
- Ensell, 963.
- Chetwynd, 965.
- De Secqueville, 965.
- Oldham, Penn, and Eades, 981.
- Noone, 983.
- Leather, 1012.
- Crickford, 1013.
- Baggs, 1018.

Copper acetates, making or obtaining :

- Neale, 6.
- Sanderson, 26.
- Bell, 34.
- Craanen, 62,
- Wyatt, 63.
- Zink, 78
- Kneller, 81.
- Benecke, 88.
- Warburton, 86.

Copper acetates, making or obtaining—*cont.*
  Hagner, 89.
  Richardson, 319.
  Tolhausen (*Rousse*), 751.
  Rowland, 986.

Copper arseniates or arsenites. *See* Arseniates.

Copper borate. *See* Boracic acid.

Copper bromides. *See* Bromine.

Copper carbonate, making or obtaining:
  Sanderson, 26.
  Clark (*Marguerìtte and De Sourdeval*), 735.
  McClintock, 758.
  Gerland, 788.
  Baggs and Simpson, 838.
  Deane, 974.
  Rowland, 986.

Copper chlorides, making or obtaining:
  Craanen, 62.
  Wyatt, 68.
  Hunt, 164.
  Cookson, 167.
  Longmaid, 194.
  Longmaid, 206.
  Gossage, 293.
  Dulin, 435.
  Bouck, 562.
  Leisler (*Hasenclever*), 605.
  Henderson, 614.
  Henderson, 651.
  Laurens, 655.
  Dahl, 665.
  Longmaid, 671.
  Henderson and Down, 700.
  Spence, 708.
  Cobley, 710.
  Mease, 719.
  Down, 730.
  Haeffely, 748.
  Spence and Mellor, 749.
  Tolhausen (*Rousse*), 751.
  Morris, Weare, and Monckton, 753.
  Gerland, 765.
  Bischof, 773.
  Gerland, 788.
  Dickson, 798.
  Crockford, 849.
  Newton (*De Massey, L. P. R., and L. R.*), 878.
  Mallet, 950.

Copper chlorides, making or obtaining—*cont.*
  Chetwynd (*De Secqueville*). 965.
  Deane, 974.
  Mallet, 1015.
  De Wissocq and Krasinski 1016.

Copper hyposulphates, hyposulphites, and sulphites:
  Dickson, 798.
  Whelpley and Storer, 990.

Copper iodide. *See* iodine.

Copper nitrates:
  Craanen, 62.
  Roberts, 322.
  Leese, 440.
  Dale, 465.
  Henderson and Down, 700.
  Tolhausen (*Rousse*), 751.

Copper oxides, making or obtaining:
  Sanderson, 26.
  Wyatt, 68.
  Zink, 78.
  Poole, 161.
  Hunt, 164.
  Cookson, 167.
  Dyer, 182.
  Longmaid, 194.
  Newton, 199.
  Stagg, 202.
  Longmaid, 206.
  Longmaid, 226.
  De Sussex, 232.
  Wall, 255.
  Laming and Evans, 286.
  De Douhet, 291.
  Gossage, 293.
  Longmaid, 306.
  Richardson, 319.
  Brooman, 404.
  Kuczynski, 418.
  Evans and McBryde, 433.
  Blythe and Kopp, 442.
  Johnson (*Persoz*), 450.
  Holland, 462.
  Hähner, 480.
  Newton, 537.
  Henderson, 548.
  Henderson, 614.
  Henderson, 651.
  Henderson and Down, 700.
  Cobley, 710.
  Cobley, 745.
  McClintock, 758.
  Bischof, 773.
  Clark, 778.
  Johnson (*Burton*), 783.
  Brooman (*Burnet*), 833.
  Baggs and Simpson, 838.
  Crockford, 849.

Copper oxides, making or obtaining—*cont.*

- Newton (*De Massy, L. P. R. and L. R.*), 878.
- Reynold, 907.
- Spence, 948.
- Davies (*Rémond*), 979.
- Whelpley and Storer, 990.
- De Wissocq and Krasinski, 1016.

Copper oxides, revivifying:

- Laming and Evans, 286.
- Leslie, 686.

Copper silicate:

- De Sussex, 252.
- Cobley, 745.

Copper sub-sulphate. *See* Copper sulphates.

Copper sulphates, making or obtaining:

- Sanderson, 26.
- Craanen, 62.
- Wyatt, 68.
- Zink, 78.
- Cookson, 167.
- Newton, 199.
- Duclos de Boussois, 200.
- Bankart, 227.
- Birkmyre, 258.
- Gossage, 293.
- Gossage, 301.
- Longmaid, 306.
- Richardson, 319.
- Roberts, 323.
- Petrie, 328.
- Condy, 401.
- Leese, 440.
- Holland, 452.
- Lozano, 468.
- Newton, 537.
- Henderson, 548.
- Bouck, 562.
- Normandy, 594.
- Crockford, 605.
- Gossage, 610.
- Henderson, 651.
- Dahll, 665.
- Leslie, 686.
- Spence, 708.
- Spence, 717.
- Mease, 719.
- Laing, 727.
- Down, 730.
- McArdle, 740.
- Haeffely, 748.
- Spence and Mellor, 749.
- Tolhausen (*Rousse*), 751.
- McClinlock, 758.
- Gerland, 765.
- Gerland, 788.

Copper sulphates, making or obtaining—*cont.*

- Dickson, 798.
- Baggs and Simpson, 838.
- Reynolds, 907.
- Deane, 974.
- Whelpley and Storer, 990.
- De Wissocq and Krasinski 1016.

Copper sulphides or sulphurets, making or obtaining:

- Wyatt, 68.
- Samuel, 145.
- Poole, 161.
- Cookson, 167.
- Rowlandson, 273.
- De Douhet, 291.
- Swindells, 299.
- Longmaid, 306.
- Longmaid, W. and J., 372.
- Kuczynski, 418.
- Blythe and Kopp, 442.
- Muspratt and Gerland, 511.
- Muspratt and Gerland, 536.
- Maltby, 538.
- Gossage, 610.
- Henderson, 614.
- Laming, 634.
- Leslie, 686.
- West, 699.
- Townsend and Walker, 714.
- Haeffely, 748.
- McClintock, 758.
- Johnson (*Burton*), 783.
- Dickson, 798.
- Brooman (*Burnet*), 835.
- Baggs and Simpson, 838.
- Spence, 858.
- Spence, 874.
- Deane, 974.
- Davies (*Rémond*), 979.
- Spence, 985.

Copper sulphocyanide:

- Spence, 858.
- Spence, 874.

Copper and ammonia:

- Leese, 440.

Copperas. *See* Iron protosulphate.

Corrosive sublimate. *See* Mercury chlorides.

Cotton seed, use of:

- Barruel, 489.
- Doughty, 879.

Creosote. See Phenic acid.

Crucibles, making:
White, 19.
Graham, 201.
Cliff, 222.

Cryolite, use of:
Spilsbury, 492.
Cobley, 745.
Thornthwaite, 867.
Ward, 888.

Cumin and its salts:
Castets, 425.

Cyanides and phosphorus:
Binks, 518.

Cyanogen, making or obtaining:
Newton, 204.
Turner, 207.
Turner, 234.
Swindels, 209.
Radley, 220.
Binks, 230.
Crane and Jullion, 200.
Hills, 1022 (*Appendix*).
Laming and Evans, 286.
Hills, 314.
Binks, 517.
Binks, 518.
Taylor and Owen, 524.
Wrightson, 643.
Gélis, 690.
Chisholm, Chisholm, and Kent, 703.
Mounckton, 771.
Hutchinson, 781.
Marriott and Holroyd, 820.
Lorberg, 833.
Lorberg, 856.
Tooth, 868.
Tooth, 893.

Cyanogen-sulpho:
Wrightson, 606.
Spence, 858.

Dialysis, application of:
Church, 770.
Whitelaw, 871.

Elaidic acid:
Moinier, 404.

Epsom salts. *See* **Magnesia sulphate.**

Esparto grass, waste liquors from. *See* **Paper, &c., making fluids from.**

Ether, acetic:
Watson and Slater, 339.

Ethyl iodine. *See* **Iodine.**

Fluorine, fluorides, fluosilicates, making or obtaining:
Spilsbury and Maugham, 127.
Ward (*Wynants*), 559.
Newton (*Le Chatelier*), 566.
Henry, 586.
Newton (*Le Chatelier*), 583.
Cobley, 744.
Cobley, 745.
Cobley, 746.
Brooman (*Tessie du Motay and Karcher*), 898.
Weldon, 971.
Weldon, 1007.

Gallic acid. *See* **Tannic acid.**

Gas making or producing, products from:
Dundonald, 28.
Winsor, 65.
Winsor, 70.
Winsor, 71.
Winsor, 72.
Taylor, 84.
Warburton, 86.
Ledsam, 99.
Livesey, 107.
Croll, 139.
Croll, 172.
Cormack, 219.
Radley, 220.
Constable, 222.
Croll, 224.
Hills, 227.
Hills, 240.
Laming, 236.
Croll, 263.
Hills, 268.
Hills, 1022 (*Appendix*).
Cormack, 284.
Laming and Evans, 2 6.
Michiels, 289.
Barlow and Gore, 304.
Lowe and Evans, 312.
Lowe and Evans, 313.
Losh, 321.
Kirkham, J. and T. N., 324.
Laming, 325.
Belford, 336.
Chisholm, 337.
Laming, 347.
Michiels, 350.
Aymard (*Soloman*), 366.
Souchon, 337.
Souchon, 369.
Chisholm, 375.
Laming, 380.
Bowditch, 400.

Gas making or producing, products from—*cont.*
Newton, 408.
Laming, 427.
Laming, 442.
Laming, 475.
Gossage, 504.
Laming, 523.
Maltby, 538.
Hills, 539.
Spencer, 558.
Boulton, 567.
Greenshields, 572.
Laming, 600.
Laming, 634.
Wrightson, 643,
Hills, 650.
Wrightson, 666.
Senior and Slatter, 671.
Croll, 677.
Keates, 681.
Richardson, 685.
Stenhouse, 689.
Jullion, 724.
Lorberg, 728.
Smith, 742.
Cleland, 768.
Livesey, 787.
Warner, 791.
Fox, 822.
Leigh, 825.
Baggs and Simpson, 838.
Lorberg, 852.
Lorberg, 856.
Tooth, 858.
Lorberg, 859.
Laming, 863.
Spence, 874.
Hills, 881.
Clark (*Archereau*), 886.
Bowditch, 922.
Richardson and Rucker, 931.
Davey, 931.
Livesey, 936.
Bell, 959.
Rennay, 968.
Muspratt, 977.
Lunge, 981.
Spence, 985.

Gas making, retorts, &c. for:
Dundonald, 28.
Winsor, 65.
Winsor, 70.
Winsor, 71.
Winsor, 72.
Taylor, 84.
Warburton, 86.
Gibbins and Wilkinson, 91.
Constable, 222.
White, 276.
Michiels, 289.
Souchon, 369.
Bower, 677.
Leslie, 686.

Gas making, retorts, &c. for—*cont.*
Lorberg, 729.
Cleland, 768.
Fox, 822.
Bousfield (*Elmer*), 832.
Lorberg, 852.
Tooth, 868.
Clark (*Archereau*), 886.
Tooth, 893.

Gas, purifying:
Winsor, 65.
Winsor, 70.
Winsor, 71.
Winsor, 72.
Taylor, 84.
Ledsam, 99.
Wright, 101.
Lowe, 107.
Croll, 139.
Croll, 172.
Cormack, 219.
Radley, 220.
Hills, 227.
Johnson, 233.
Laming, 256.
Croll, 265.
Hills, 268.
Hills, 1022 (*Appendix*).
Cormack, 284.
Laming and Evans, 286.
Michiels, 289.
Barlow and Gore, 304.
Lowe and Evans, 312.
Lowe and Evans, 313.
Kirkham, J. and T. N., 324.
Bellford, 336.
Chisholm, 337.
Souchon, 337.
Laming, 347.
Michiels, 350.
Souchon, 369.
Chisholm, 375.
Laming, 389.
Bowditch, 400.
Newton, 408.
Laming, 427.
Laming, 442.
Laming, 475.
Stott, 492.
Gossage, 504.
Laming, 523.
Maltby, 538.
Spencer, 558.
Boulton, 567.
Greenshields, 572.
Evans, 587.
Laming, 600.
Laming, 634.
Parker, 641.
Wrightson, 643.
Hills, 650.
Wrightson, 666.
Senior and Slatter, 671.
Croll, 677.

Gas, purifying—*cont.*
- Keates, 681.
- Richardson, 685.
- Leslie, 686.
- Stenhouse, 689.
- Lorberg, 728.
- Smith, 742.
- Richardson, 755.
- Cleland, 768.
- Livesey, 787.
- Warner, 791.
- Fox, 822.
- Leigh, 825.
- Baggs and Simpson, 833.
- Lorberg, 852.
- Hills, 881.
- Richardson and Rücker, 931.
- Davey, 931.
- Livesey, 936.
- Lunge, 981.

Gases from alum making:
- Spence, 607.

Gases from blast furnaces, products from:
- Horton and Price, 922.

Gases, waste, of vitriol chambers, use of:
- Hunt, 327.
- Firmin, 483.
- Spence, 546.
- Newton, 563.
- Spence, 587.
- Laing, 727.
- Laing and Swindells, 733.
- Ogston, 818.
- Spence, 835.

Gelatine:
- Schmersahl, 530.
- Richardson, 697.
- Gerland, 849.
- Martin, 977.

Glass, soluble. *See* Potash silicate or soda silicate.

Glauber's salt. *See* Soda sulphate.

Gold chloride:
- Henderson, 614.
- Chetwynd (*De Secqueville*), 965.

Gold hyposulphite:
- Reade, 244.

Gold nitrate:
- Petrie, 328.

Gold oxides:
- Reade, 244.
- Henderson, 614.
- Cobley, 745.

Gold sulphide:
- Radley, 493.
- Henderson, 614.

Green vitriol. *See* Iron protosulphate:

Gunpowder, making:
- Roberts and Dale, 769.
- Meyer, A. and M. (*Gerhardt*), 920.

Heat from blast furnaces, coke ovens, limekilns, &c., use of:
- Green, 7.
- Conway, 31.
- Stone, 38.
- Grellier, 73.
- Heathorn, 95.
- Flude, 136.
- Neville, 148.
- Smith, 174.
- Newton, 200.
- Cookson, 207.
- Gamble, 214.
- Todd, 284.
- Lamb and Menday, 327.
- Henderson, 354.
- Hunt, 384.
- Allen, J. and W., 452.
- Jenkin, 578.
- Johnson (*Persoz*), 628.
- Medlock, 637.
- Roman, 739.
- Cleland, 768.
- Joseph, 772.
- Brooman (*Lequin*), 862.
- Gjers, 871.
- Gisborne, 884.
- Clark (*Archereau*), 886.
- Ward, 888.
- Chamberlain, Craven, and Wedekind (*Hoffmann*), 895.
- Hall and Roosen, 898.
- Crampton, 900.
- Scott and Tudor, 903.
- Todd, 967.
- Lycett, 969.
- Routledge and Richardson, T. and W. H., 975.
- Amos and Anderson, 976.
- Swann, 985.
- Price (*Bührer and Hamel*), 988.
- Hunstmann, 995.
- Clark (*Cotelle*), 1000.
- Davis, 1002.
- Stevenson, 1007.
- Claudet, 1009.
- Baggs, 1018.

Hops, spent, use of:
- Grace, 57.
- Cronier, 160.
- Owen, 498.
- Taylor and Owen, 524.

Hydriodic acid. *See* Iodine.

Hydrobromic acid. *See* Bromine.

Hydrochloric acid, making or obtaining:
- Sedgwicke, 14.
- Higgins, 29.
- Dundonald, 42.
- Dundonald, 44.
- Howard, 57.
- Wyatt, 68.
- London, P. and P. jun., 74.
- Fuller, 89.
- Maugham, 114.
- Clay, 123.
- Lutwyche, 123.
- Swindells, 125.
- Gossage, 125.
- Spilsbury and Maugham, 127.
- Gossage, 130.
- Sheridan, 131.
- Losh, 133.
- Barratt, 149.
- Ford, 153.
- Rowe, 155.
- Duclos, 157.
- Hunt, 164.
- Blanc and Bazille, 168.
- Longmaid, 206.
- Turner, 210.
- Barratt, 215.
- Oxland, 217.
- Longmaid, 226.
- Hills, 227.
- Bell, 231.
- Gossage, 232.
- De Sussex, 238.
- Hills, 240.
- Jullion, 243.
- De Sussex, 249.
- Dunlop, 251.
- De Sussex, 252.
- Crane and Jullion, 260.
- Young, 270.
- Laming and Evans, 286.
- Fontainmoreau, 292.
- Gossage, 293.
- Liebhaber, 300.
- Gautier, 347.
- Robb, 366.
- Richardson, 373.
- Cunninghame, 386.
- Condy, 401.
- Moinier, 404.
- Hahner, 411.
- Plisson, 417.
- Margueritte, 434.

Hydrochloric acid, making or obtaining—*cont.*
- Margueritte, 437.
- Armbruster and Laist, 445.
- Johnson (*Persoz*), 450.
- Favre, 454.
- Atkinson, 455.
- Bellford (*Kuhlmann*), 456.
- Margueritte, 471.
- Barrow, 477.
- Hahner, 480.
- Radley, 498.
- Petrie, 499.
- Monod, 501.
- Elliot, 503.
- Clark, 507.
- Deely, 516.
- Siemens, 533.
- Kenyon, 541.
- Henderson, 548.
- Fraser, 552.
- Bouck, 562.
- Newton (*Le Chatelier*), 566.
- Fraser, 573.
- Newton (*Le Chatelier*), 588.
- Clark (*Martin*), 602.
- Roberts and Dale, 594.
- Mennons (*De Siebenthal*), 613.
- Henderson, 614.
- Gossage, 646.
- Henderson, 651.
- Arrott, 681.
- Binks, 683.
- Seitz, 691.
- Clapham, 695.
- Richardson and Prentice, 696.
- Henderson and Down, 700.
- Newton (*Le Chatelier*), 706.
- Cobley, 710.
- Binks, 717.
- De Meley, 735.
- Cobley, 745.
- Gillard, 747.
- Martin, 750.
- Brooman (*Aubertin*), 760.
- Binks, 786.
- Gerland, 788.
- Dickson, 793.
- Gossage, 795.
- Noble, 800.
- Hunt, 808.
- Richardson, 817.
- Binks, 820.
- Swinbourne, 821.
- Brooman (*Burnet*), 835.
- Clapham, 859.
- Clemm, 845.
- Baggs and Simpson, 902.
- Scott and Tudor, 903.
- Johnson, 903.
- Henderson, 920.
- Claus, 935.
- Dufrene (*Tellier*), 938.
- Gillard, 940.
- Henry (*Laurent*), 963.

Hydrochloric acid, making or obtaining—*cont.*

- Weldon, 971.
- Weldon, 972.
- Martin, 977.
- Marçais, 989.
- Davies (*Rémond*), 997.
- Weldon, 997.
- Newton (*Baker, Poole, and Stace*), 998.
- Clark (*Cotelle*), 1000.
- Weldon, 1007.
- Claudet, 1009.
- Crockford, 1013.
- Baggs, 1018.

Hydrocyanic or prussic acid :

- Laming, 201.
- Binks, 230.

Hydrofluoric acid. *See* Fluorine.

Hydrofluosilicic acid. *See* fluorine.

Hydrogen gas, production of :

- Barratt, 149.
- Chénot, 246.
- Watt, 309.
- Watson and Slater, 339.
- Gantier, 347.
- Chenot, 405.
- Thibierge, 467.
- Chisholm, Chisholm, and Kent, 703.
- Bousfield (*Elmer*), 832.

Hydrogen sulphide or sulphuret, making or obtaining :

- Dundonald, 28.
- Gossage, 130.
- Gossage, 136.
- Fowler, 143.
- Wilson, 146.
- Binks, 149.
- Duclos, 157.
- Cookson, 167.
- Wilson, 169.
- Blair and Watson, 170.
- Rodgers, 197.
- Newton, 203.
- Lee, 208.
- Radley, 220.
- Hills, 227.
- Laming, 256.
- Laming, 266.
- Stones, 285.
- Fontainmoreau, 292.
- Taylor, 293.
- Roberts, 330.
- Price, 330.
- Gossage, 344.
- Taylor and Phillips, 349.
- Werckshagen, 358.

Hydrogen sulphide or sulphuret, making or obtaining—*cont.*

- Clark, 359.
- Böhringer and Clemm, 370.
- Laming, 442.
- Favre, 454.
- Lozano, 468.
- Johnson (*Tassy de Montluc and Gauthier*), 494.
- Gossage, 526.
- Gossage, 546.
- Gossage, 591.
- Gossage, 595.
- Gossage, 608.
- Newton (*Le Chatelier*), 619.
- Brooman (*Demangeot and Co.*), 643.
- Gossage, 646.
- Hunter, 656.
- Willans, 658.
- Hunt, 669.
- Arrott, 681.
- Hunt, 705.
- Laming (*Laming*), 738.
- Brooman (*Delaune*), 776.
- Croll, 791.
- Dickson, 793.
- Verstraet and Olivier, 802.
- Brooman (*Burnet*), 835.
- Clemm, 845.
- Forbes, 894.
- Binks, 910.
- Livesey, 936.
- Bankart, 953.
- Lunge, 981.
- Robinson, 1003.
- Bousfield (*Hofmann*), 1005.

Hydrosulphuric acid. *See* Hydrogen sulphide.

Hyponitrous acid. *See* Nitrous fumes.

Hyposulphurous acid. *See* Sulphurous acid.

Iodates or iodides. *See* Iodine.

Iodine, iodides, hydriodic acid, and iodates, making or obtaining :

- Reade, 244.
- Murdoch, 361.
- De Busac, 380.
- Lyte, 383.
- Faure, 405.
- Wilson and Horsley, 444.
- De Busac, 460.
- Therouldc, 598.
- Stanford, 738.
- McArdle, 740.
- Patterson, 778.

Iodine, iodides, hydriodic acid, and iodates, making or obtaining—*cont.*

- Dickson, 793.
- Walker, 806.
- Readman, 829.
- Moride, 906.
- McCrummen, 939.
- Paraf, 1003.
- Wanklyn, 1003.
- Johnson (*Wanklyn*), 1008.

Iodine, residues from, making:

- Paterson, 778.
- Walker, 806.

Iodohydric acid. *See* Iodine.

Iron, acetates of:

- Bell, 34
- Ashworth, 61.
- Cormack, 219.
- Chenot, 246.
- Tolhausen (*Rousse*), 751.

Iron arseniates or arsenites. *See* Arseniates.

Iron bromide. *See* Bromine.

Iron carbonates:

- Wilson, 146.
- Pattinson, 186.
- Laming, 256.
- Dering, 364.
- Stott, 472.
- Gossage, 506.
- Brooman (*Delane*), 776.
- Paterson, 778.
- Deane, 974.

Iron chromates. *See* Chromic acid.

Iron chlorides, making or obtaining:

- Wyatt, 68.
- Gossage, 136.
- Fowler, 143.
- Wilson, 146.
- Jons, 190.
- Chenot, 246.
- Laming and Evans, 286.
- Swindells, 299.
- Watt, 309.
- Oliver, 363.
- Stanley, 367.
- Laming, 389.
- Henderson, 430.
- Thibierge, 467.
- Deely, 516.
- Newton (*Le Chatelier*), 588.
- Leisler (*Hasenclever*), 605.

Iron chlorides, making or obtaining—*cont.*

- Gossage, 610.
- Henderson, 614.
- Newton (*Le Chatelier*), 619.
- Dales, 640.
- Wrightson, 643,
- Richardson and Prentice, 662.
- Dahll, 665.
- Wrightson, 686.
- West, 699.
- Henderson and Down, 706.
- Newton (*Le Chatelier*), 707.
- Tolhausen (*Rousse*), 751.
- Richardson, 755.
- Bischof, 773.
- Gerland, 788.
- Dickson, 793.
- Johnson (*Macfarlane*), 826.
- Brooman (*Thibierge*), 828.
- Crockford, 849.
- Henderson, 929.
- Bell, 959.
- Ransford, 961.
- Marçais, 989.
- De Wissocq and Krasinski, 1016.

Iron cyanide. *See* Iron sesquiferrocyanide.

Iron iodides. *See* Iodine.

Iron nitrates:

- Roberts, 323.
- Watson and Slater, 339.
- Fontainemoreau, 437.
- Dale, 465.
- Tolhausen (*Rousse*), 751.
- Morris, Weare, and Monckton, 753.

Iron oxide, magnetic:

- Deacon, 558.
- Spencer, 558.
- Spencer, 568.
- Spencer, 581.
- Spencer, 583.
- Spencer, 617.
- Wilson, 629.
- Dales, 640.

Iron oxides, revivifying:

- Hills, 1022 (*Appendix*).
- Laming and Evans, 286.
- Hills, 314.
- Chisholm, 375.
- Laming, 389.
- Laming, 475.
- Laming, 523.
- Evans, 587.
- Parker, 641.
- Hills, 650.
- Laming and Smith, 694.
- Warner, 791.

Iron oxides, revivifying—*cont.*
  Coffey and Redwood, 805.
  Hartley (*Hurwitz*), 822.
  Fox, 822.
  Brooman (*Burnet*), 835.
  Hills, 881.
  Lunge, 981.

Iron oxides, spent, use of:
  Hills, 539.
  Bell, 551.
  Spencer, 558.
  Boulton, 567.
  Evans, 567.
  Arrott, 629.
  Wrightson, 643.
  Wrightson, 666.
  Cleland, 768.
  Hartley (*Hurwitz*), 822.
  Hills, 881.
  Richardson and Rucker, 931.
  Bell, 959.
  Muspratt, 977.

Iron peroxide, anhydrous, making or obtaining:
  Sanderson, 26.
  Dundonald, 44.
  Phillips, 112.
  Linning, 129.
  Duclos de Boussois, 157.
  Cookson, 167.
  Farmer, 168.
  Croll, 172.
  Gregson, 177.
  Dyer, 182.
  Newton, 199.
  Longmaid, 206.
  Longmaid, 226.
  Wall, 255.
  Longmaid, 256.
  Gossage, 293.
  Gossage, 301.
  Lowe and Evans, 312.
  Roberts, 323.
  Laming, 325.
  Oliver, 363.
  Dering, 364.
  Robb, 368
  Binks, 376.
  Richardson, 378.
  Cookson, 408.
  Haeffely, 409.
  Blythe and Kopp, 429.
  Evans and McBryde, 433.
  Clapham, 447.
  Johnson (*Persoz*), 450.
  Martien, 460.
  Dale, 465.
  Thibierge, 467.
  Laming, 475.
  Spilsbury, 483.
  Spencer, 558.
  Greenwell, 560.
  Imeary and Richardson, 576.

Iron peroxide, anhydrous, making or obtaining—*cont.*
  Newton (*Le Chatelier*), 588.
  Gossage, 610.
  Newton (*Le Chatelier*), 619.
  Spencer, 642.
  Hunt, 705.
  Newton (*Le Chatelier*), 706.
  Ralston, 711.
  Mease, 719.
  Pask, 743.
  Webster, 758.
  Gerland, 765.
  Warner, 767.
  Bischof, 773.
  Clark (*Marguerittle and De Sourdeval*), 779.
  Johnson (*Burton*), 783.
  Gerland, 788.
  Warner, 790.
  Warner, 791.
  Noble, 800.
  Coffey and Redwood, 805.
  Marriott and Holroyd, 820.
  Hartley (*Hurwitz*), 822.
  Fox, 822.
  Johnson (*Macfarlane*), 826.
  Brooman (*Burnet*), 835.
  Clemm, 845.
  Crockford, 849.
  Clark (*Gélis and Dusart*), 854.
  Bowron and Robinson, 859.
  Bowron and Robinson, 865.
  Pughsley, 894.
  Brooman (*Aubertin*), 901.
  Dufrené (*Tellier*), 938.
  Bousfield (*Hofmann*), 1005.
  Claudet, 1009.
  De Wissocq and Krasinski, 1016.

Iron peroxide, hydrated, making or obtaining:
  Sanderson, 26.
  Wilson, 146.
  Laming, 256.
  Hills, 1022 (*Appendix*).
  Laming and Evans, 286.
  De Douhet, 297.
  Gossage, 301.
  Lowe and Evans, 312.
  Hills, 314.
  Laming, 325.
  Pettitt, 329.
  Dering, 364.
  Chisholm, 375.
  Dunn, 435.
  Martien, 460.
  Laming, 475.
  Hähner, 480.
  Laming, 523.
  Gossage, 526.
  Newton, 537.
  Henderson, 548.
  Deacon, 558.

Iron [illegible], making or obtaining—cont.

[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
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[illegible] and [illegible], [illegible]
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[illegible] and [illegible], [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible], 1017.

Iron persulphate, making or obtaining:

[illegible], 1[illegible]
[illegible], 214
Gossage, [illegible].
[illegible] and Richardson, 612.
Gossage, 614.
Weighton, 643.
Weighton, [illegible].
De Meley, 726.
Smith, 742.
Cleland, 788.
Hills, 881.
Claudet, 1009.

Iron phosphates and phosphurets:

Chenot, 246.
De Meley, 785.
Gerland, 789.
Gerland, 840.
Brooman (*Aubertin*), 901.

Iron protosulphate, making or obtaining:

Price, 18.
Sanderson, 20.
Murdoch, 37.
Dundonald, 48.
[illegible], 69.
[illegible], 70.
[illegible], 71.
[illegible], 72.
[illegible], 100.
Phillips, 112.
Fowler, 143.
Wilson, 144.
Hunt, 161.
Gregson, 177.
Jones, 190.

Iron protosulphate, making or obtaining—cont.

[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible] *[illegible]*
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
Hunt, [illegible].
Cunninghame, [illegible].
Holland, [illegible].
Price, [illegible].
Spilsbury, [illegible].
Crawford, [illegible].
Gossage, [illegible].
Richardson and [illegible] [illegible].
West, [illegible].
Mease, 718.
Laing, 727.
[illegible] (*[illegible]*), 7[illegible].
Cleland, 788.
Johnson (*Macfarlane*), [illegible]
Spence, 835.
Hills, 881.
[illegible], [illegible].
Brooman (*Aubertin*), 90[illegible].
Binks, 910.
Dufrené (*De [illegible]*), 9[illegible]
[illegible], 958.
Chetwynd (*De Sequeville*), 965.
Whelplay and Storer, 990.
Weldon, 997.
Claudet, 1009.
De Wissocq and Krasinsk 1016.

Iron protosulphate, refuse from use of:

Hallsworth and Platt, 852.

Iron protoxide, making or obtaining:

Gregson, 177.
Napier, 214.
Napier, 221.
Longmaid, 269.
De Douhet, 291.
Swindells, 290.
Dering, 384.
Stott, 472.
Muspratt and Gerland, 511
Muspratt and Gerland, 536.
Deacon, 558.
Deacon, 568.
Deacon, 581.
Hills, 881.

Iron sesqui-ferrocyanide or prussiate, making or obtaining:
- Brown and Hendrick, 106.
- Lowe, 107.
- Attwood, 111.
- Simmons, 113.
- Swindells, 156.
- Wiesmann, 160.
- Hervey, 162.
- Turner, 207.
- Lowe, 238.
- Reade, 244.
- Hills, 1022 (*Appendix*).
- Watson and Slater, 339.
- Spence, 403.
- Johnson, 470.
- Brunel, 482.
- Boulton, 567.
- Newton (*Le Chatelier*), 619.
- Newton (*Féraud, Laureau, and Richard*), 642.
- Webster, 691.
- Newton (*Le Chatelier*), 703.
- De Meley, 735.
- Stuart, 756.
- Brooman (*Aubertin*), 760.
- Hallsworth and Platt, 852.
- Brooman (*Paraf-Javal*), 900.
- Paraf (*Paraf-Javal*), 902.

Iron sub-sulphate. *See* Iron proto-sulphate.

Iron sulphide or sulphuret, making or obtaining:
- Higgins, 29.
- Fowler, 143.
- Wilson, 146.
- Croll, 172.
- Laming, 201.
- Johnson, 230.
- Chenot, 246.
- Hills, 1022 (*Appendix*).
- Cormack, 284.
- De Douhet, 291.
- Bell, 345.
- Cottrill, 355.
- Dering, 364.
- Zenner, 368.
- Longmaid, W. and J., 372.
- Gossage, 374.
- Cookson, 408.
- Bramwell, 421.
- Blythe and Kopp, 429.
- Clapham, 447.
- Stott, 472.
- Gossage, 506.
- Claus, 520.
- Laming, 523.
- Gossage, 526.
- Croll, 539.
- Spencer, 558.
- Deacon, 568.
- Deacon, 568.
- Deacon, 581.

Iron sulphide, or sulphuret, making or obtaining—*cont.*
- Evans, 587.
- Bethell, 592.
- Gossage, 595.
- Laming, 600.
- Gossage, 610.
- Spencer, 617.
- Arrott, 629.
- Wilson, 629.
- Laming, 634.
- Spencer, 642.
- Wrightson, 643.
- Laming, 645.
- Gossage, 646.
- Willans, 653.
- Wrightson, 666.
- Keates, 681.
- Laming and Smith, 684.
- Richardson, 685.
- Gélis, 690.
- Seitz, 691.
- Townsend and Walker, 714.
- Willans, 730.
- Clarke (*Margueritte and De Sourdeval*), 735.
- Smith, 742.
- Cleland, 768.
- Brooman (*Delaune*), 776.
- Paterson, 778.
- Johnson (*Burton*), 783.
- Warner, 791.
- Coffey and Redwood, 805.
- Walker, 808.
- Marriott and Holroyd, 820.
- Hartley (*Hurwitz*), 822.
- Fox, 822.
- Johnson (*Macfarlane*), 826.
- Brooman (*Burnet*), 835.
- Clemm, 845.
- Clark (*Gélis and Dusart*), 854.
- Bowron and Robinson, 859.
- Dixon, 860.
- Laming, 863.
- Bowron and Robinson, 835.
- Hills, 881.
- Brooman (*Aubertin*), 901.
- Bankart, 953.
- Ensell, 963.
- Lunge, 981.
- Bousfield (*Hofmann*), 1005.

Iron sulphite:
- Bankart, 953.
- Ensell, 963.

Japonic acid. *See* Tannic acid.

Kelp, making or improving. *See* Seaweed products.

Kilns for burning lime. *See* Lime making or obtaining.

Lamp black. *See* Carbon.

Lead acetates, making or obtaining:

- Bell, 34.
- Whitton, 57.
- Chisholm and Bellemois, 147.
- Roederer, 155.
- Flude, 158.
- Richardson, 162.
- Mullins, 156.
- Cormack, 219.
- Richardson, 320.
- Symonds, 523.
- Hills, 556.
- Burton, 563.
- Clark (*De Rostaing*), 574.
- Spilsbury, 580.
- Dick, 596.
- Emerson, 606.
- Herbert (*Brumlen*), 641.
- Herbert (*Brumlen*), 663.
- Cobley, 704.
- Cobley, 718.
- Liedemann and Lange (*Brumlen*), 725.
- Phillips, 728.
- Toolhausen (*Rousse*), 751.
- Lake, (*Bell, Fell, and Fell*), 994.
- Bonneville (*Hebart*), 1016.

Lead carbonate, making or obtaining:

- Eland, 1.
- Rosse, 4.
- Roberts, 4.
- Creed, 16.
- Bell, 34.
- Fishwick, 35.
- Keeling, 47.
- Dundonald, 50.
- Wilkinson, 55.
- Whitton, 57.
- Grace, 57.
- Saxelbye, 64.
- Winsor, 65.
- Keir, 67.
- Winsor, 70.
- Noble, 71.
- Winsor, 71.
- Brierly, 72.
- Winsor, 72.
- Hagner, 89.
- Sadler, 90.
- Ham, 97.
- Groves, 98?
- Torassa, Muston, and Wood, 110.
- Gossage and Benson, 116.
- Hemming, 123.
- Sewell, 128.
- Maugham, 130.

Lead carbonate, making or obtaining—*cont.*

- Button and Dyar, 132.
- Watt and Tebbutt, 134.
- Benson, 137.
- Sewell, 139.
- Heard, 140.
- Woolrich, 143.
- Cory, 144.
- Chisholm and Bellemois, 147.
- Leigh, 152.
- Hunt, 156.
- Flude, 158.
- Pattinson, 176.
- Wildes, 177.
- Wildes, 185.
- Pattinson, 186.
- Mullins, 195.
- Cormack, 219.
- Lothman, 247.
- Fourmentin, 253.
- Laming, 256.
- Richardson, 265.
- Pattinson, 266.
- Jennings, 274.
- Rodgers, 279.
- Michiels, 289.
- Watson and Slater, 339.
- Staite, 362.
- Dering, 364.
- Carter and Marriott, 377.
- Ransome, 432.
- Gossage, 461.
- Needham and Kite, 489.
- Hills, 556.
- Burton, 563.
- Clark (*De Rostaing*), 574.
- Brown and Young, 583.
- Dick, 596.
- Emerson, 606.
- Newton (*Cooper*), 613.
- Robinson, 654.
- Newton (*Mayer*), 659.
- Baker, 673.
- Keates, 681.
- Johnson (*Ozouf*), 683.
- Cobley, 704.
- Cobley, 728.
- Phillips, 728.
- Clark (*Margueritte and De Sourdeval*), 735.
- Abel (*Rowland*), 757.
- Clark (*Margueritte and De Sourdeval*), 779.
- Ozouf, 891.
- Phillips, 918.
- Bernhard (*Lagrange*), 943.
- Spence, 948.
- Delafield, 969.
- Robertson, 970.
- Lake (*Bell, Fell, and Fell*), 994.
- Lake (*Bell, Fell, and Fell*), 1014.
- Bonneville (*Hebert*), 1016.

Lead chlorides, making or obtaining :
- Birnie, 35.
- Watt and Tebbutt, 134.
- Watt and Tebbutt, 135.
- Hunt, 156.
- Turner, 234.
- De Sussex, 249.
- Losh, 321.
- Carter and Marriott, 377.
- Lyte, 383.
- Shanks (*Von Seckendorf*), 429.
- Margueritte, 434.
- Emerson, 606.
- Henderson, 614.
- Herbert (*Brumlen*), 641.
- Henderson, 651.
- Robinson, 654.
- Newton (*Mayer*), 659.
- Herbert (*Brumlen*), 663.
- Liedemann and Lange (*Brumlen*), 725.
- Tolhausen (*Rousse*), 751.
- Crockford, 849.
- Rowbotham, 1001.
- Lake (*Bell, Fell, and Fell*). 1014.

Lead ferrocyanides :
- Watson and Slater, 339.

Lead fluosilicates. *See* Fluorine.

Lead margarate :
- Watt and Tebbutt, 134.

Lead nitrate :
- Button and Dyar, 132.
- Leigh, 152.
- Richardson, 319.
- Staite, 362.
- Dunn, 435.
- Symonds, 523.
- Brown and Young, 583.
- Emerson, 606.
- Newton (*Mayer*), 659.
- Cobley, 718.
- Tolhausen (*Rousse*), 751.
- Bernhard, 913.
- Clark (*Dehaut*), 952.
- Delafield, 969.
- Lake (*Bell, Fell, and Fell*), 991.
- Lake (*Bell, Fell, and Fell*), 1014.
- Bonneville (*Hebert*), 1016.

Lead oliate :
- Watt and Tebbutt, 134.

Lead oxalate. *See* Oxalates.

Lead oxichloride, making or obtaining :
- Turner, 28?
- Fourmentin, 253.
- Pattinson, 266.
- Pattinson, 272.
- Pattinson, 303.
- Emerson, 606.
- Herbert (*Brumlen*), 641.
- Newton (*Mayer*), 659.
- Herbert (*Brumlen*), 663.
- Woods, 993.

Lead oxides, making, obtaining, or using :
- Eland, 1.
- Rosse and Roberts, 4.
- Lydall, 7.
- Turner, 28.
- Birnie, 35.
- Keeling, 47.
- Whitton, 57.
- Sheffield, 78.
- Gossage, 129.
- Watt and Tebbutt, 134.
- Watt and Tebbutt, 135.
- Sewell, 139.
- Heard, 140.
- Chisholm and Bellemois, 147.
- Flude, 159.
- Pattinson, 186.
- Mallins, 195.
- Stagg, 202.
- Longmaid, 220.
- Gossage, 232.
- Turner, 234.
- De Sussex, 249.
- Laming, 256.
- Todd, 284.
- Michiels, 289.
- Lowe and Evans, 312.
- Richardson, 319.
- Watson and Slater, 339.
- Dering, 364.
- Henderson, 382.
- Richards, 394.
- Haeffely, 409.
- Ransome, 432.
- Blythe and Kopp, 442.
- Bellford (*Kuhlmann*), 436.
- Paris, 457.
- Gossage, 461.
- Symonds, 523.
- Gossage, 523.
- Burton, 563.
- Jenkin, 573.
- Clark (*De Rostaing*), 571.
- Dick, 593.
- Emerson, 606.
- Henderson, 614.
- Nicholson, 635.
- Robinson, 654.
- Newton (*Mayer*), 659.
- Herbert (*Brumlen*), 663.

Lead oxides, making, obtaining, or using—*cont.*
- Leidemann and Lange (*Brumleu*), 725.
- Cobley, 726.
- Smith, 742.
- Cobley, 745.
- Johnson (*Burton*), 783.
- Brooman (*Burnet*), 835.
- Bennett, 841.
- Crockford, 849.
- Holdrege (*Gwynne*), 864.
- Phillips, 918.
- Spence, 948.
- Woods, 993.
- Lake (*Bell, Fell, and Fell*), 994.
- Rowbotham, 1001.
- Brooman (*Cordurié*), 1019.

Lead peroxide. *See* Lead oxides.

Lead phosphates:
- Margueritte, 434.
- Margueritte, 435.
- Paul, 529.

Lead protoxide. *See* Lead oxides.

Lead saccharum. *See* Lead acetate.

Lead silicate:
- Ransome, 432.
- Paris, 457.
- Cobley, 744.
- Cobley, 745.

Lead, sugar of. *See* Lead acetate.

Lead sulphate, making or obtaining:
- Bell, 34.
- Groves, 98.
- Watt and Tebbutt, 134.
- Hunt, 156.
- Richardson, 162.
- Gossage, 232.
- Laming, 256.
- Michiels, 289.
- Shanks (*Von Seckendorff*), 429.
- Margueritte, 435.
- Dunn, 435.
- Holland, 452.
- Newton (*Cooper*), 613.
- Henderson, 614.
- Leidemann and Lange (*Brumleu*), 725.
- Smith, 742.
- Tolhausen (*Rousse*), 751.

Lead sulphate, making or obtaining--*cont.*
- Chaudet, 939.
- Spence, 948.
- Wood, 993.
- Lake (*Bell, Fell, and Fell*), 994.
- Lake (*Bell, Fell, and Fell*), 1014.
- Bonneville (*Hebert*), 1016.

Lead stearate:
- Watt and Tebbutt, 134.

Lead sulphides or sulphurets, making or obtaining:
- Higgins, 29.
- Clayfield, 66.
- Cormack, 219.
- Laming, 256.
- Michiels, 289.
- Lowe and Evans, 312.
- Richardson, 319.
- Losh, 321.
- Dering, 364.
- Dunn, 435.
- Blythe and Kopp, 442.
- Gossage, 526.
- Maltby, 538.
- Henderson, 615.
- Smith, 742.
- Brooman (*Burnet*), 835.
- Baggs and Simpson, 838.

Lead sulphites, making or obtaining:
- Lowe and Evans, 312.
- Oldham, Penn, and Eades, 981.

Lead tungstates. *See* Tungstic acid.

Lead vitriol. *See* Lead sulphate.

Lime, making or obtaining:
- Evans, 5.
- Green, 7.
- Miller, 9.
- Neville, 12.
- Conway, 31.
- Parkes, 37.
- Stanhope, 59.
- Grellier, 73.
- Booker, 74.
- Heathorn, 95.
- Cory, 144.
- Smith, 174.
- Gregson, 215.
- Tilghman, 248.
- Fontainmoreau, 292.
- Davidson, 297.

Lime, making or obtaining—*cont.*
Barlow and Gore, 304.
Hills, 314.
Lamb and Menday, 327.
Laming, 347.
Floret, 348.
Barsham, 374.
Jacob, 389.
Tilghman, 458.
Lark, 515.
Maltby, 538.
Botturi, 543.
Gossage, 546.
Henderson, 548.
Brooman (*Simoneau*), 557.
Gossage, 591.
Gossage, 608.
Medlock, 637.
Newton (*Hoffmann and Licht*), 654.
Richardson, 685.
Courtois and De Soulange, 723.
Courtoise, 755.
Joseph, 772.
Henry (*Société Coignet & Co.*), 776.
Blackmore and Lamb, 788.
Robinson, 851.
Gjers, 871.
Gisborne, 884.
Clark (*Archereau*), 886.
Ozouf, 891.
Chamberlain, Craven, and Wedekind (*Hoffmann*), 895.
Crampton, 900.
Parker and Tanner, 913.
Routledge, 916.
Hunter, 927.
Fontainmoreau (*Poulet*), 932.
Bernhard (*Lagrange*), 943.
Swann, 985.
Price (*Bührer and Hamel*), 988.
Bonneville (*Martin and Béranger*), 995.
Hunstmann, 995.
De Berenger, 1002.
Davis, 1002.

Lime acetate, making or obtaining:
Henry, 87.
Condy, 345.
Condy, 496.
Spilsbury, 580.
Clark (*Martin*), 593.
Clark (*Martin*), 602.
Brooman (*Demangeot & Co.*), 643.
Buchholz, 698.
Lorberg, 728.
Stanford, 738.

Lime and alumina. *See* Aluminates.

Lime arseniate or arsenite. *See* Arseniates.

Lime borates. *See* Boracic acid.

Lime carbide. *See* Lime carbonate.

Lime carbonate, making or obtaining:
Gossage, 130.
Dyar and Hemming, 138.
Fowler, 143.
Wilson, 146.
Croll, 159.
Smith, 174.
Laming, 201.
Gregson, 216.
Cormack, 219.
Hills, 227.
Laming, 250.
Laming and Evans, 286.
Barlow and Gore, 304.
Laming, 347.
Murdoch, 361.
Thwaites and Herapath, 393.
Gwynne, J. and J. E. A., 395.
Margueritte, 437.
Dunlop, 471.
Gossage, 591.
Emerson, 606.
Jullion, 724.
Noble, 743.
Oliver, Grantham, Sinnock, and Leverson, 754.
Gossage, 775.
Verstraet and Olivier, 802.
Clemm, 845.
Lorberg, 856.
Shanks, 870.
Newton (*Baug*), 909.
Routledge, 916.
Tobin, 984.

Lime chloride, chlorate, or chlorite. *See* Chlorine, making or obtaining.

Lime chromates. *See* Chromic acid.

Lime citrates. *See* Citric acid.

Lime hyposulphate, hyposulphite, and sulphite:
Binks, 149.
Michiels, 350.
Smith and McDougall, 402.
Horsford, 417.

Lime hyposulphate, hyposulphite, and sulphite—*cont.*
- Townsend and Walker, 687.
- Townsend and Walker, 714.
- Jullion, 724.
- Noble, 743.
- Jullion, 800.
- Schnell (*Mond*), 803.
- Jones, 878.
- Jones, 884.
- Stevenson, 924.
- Clapham, 839.
- Clapham, 844.
- Schaffner, 948.

Lime kilns, heat from, use of. *See* Heat from blast furnaces, &c., use of.

Lime muriate. *See* Calcium chloride.

Lime nitrates and nitrites:
- Crane and Jullion, 260.
- Watt, 309.
- Price, 330.
- Newton, 563.
- Henderson, 668.
- Leverson (*Oliver*), 913.
- Parker and Tanner, 913.

Lime oxalate. *See* Oxalates.

Lime phosphates, making or obtaining:
- Laming, 347.
- Richardson, 361.
- Richardson, 373.
- Margueritte, 434.
- Margueritte, 435.
- Newton (*Horsford*), 485.
- Newton (*Horsford*), 501.
- Newton, 514.
- Ritterbandt, 519.
- Laming, 523.
- Schmersahl, 532.
- Henderson, 548.
- Richardson and Prentice, 551.
- Bessemer, 553.
- Clark (*Martin*, 593.
- Clark (*Martin*), 597.
- Clark (*Martin*), 602.
- Emerson, 606.
- Mennons (*De Siebenthal*), 613.
- Nation, 630.
- Bryant, 687.
- Richardson and Prentice, 696.
- Richardson, 697.
- De Meley, 735.
- Clark (*Margueritte and De Sourdeval*), 735.

Lime phosphates, making or obtaining—*cont.*
- Martin, 750.
- Kernot and Rucker, 756.
- Brooman (*Aubertin*), 760.
- Brooman (*Leplay and Cuisinier*), 765.
- Gerland, 849.
- Johnson (*Pollock*), 876.
- Clark (*Lesieur*), 891.
- Brooman (*Aubertin*), 901.
- Leverson (*Oliver*), 913.
- Martin, 977.
- Norrington, 1020.

Lime prussiate. *See* Calcium cyanides.

Lime refuse of gasworks, use of. *See* Calcium sulphide.

Lime silicates, making or obtaining:
- Higgin, 372.
- Newton, 514.
- Henderson, 548.
- Ward (*Wynants*), 559.
- Henry, 586.
- Clark (*Martin*), 602.
- Gossage, 622.
- Gossage, 623.
- Eden, 731.
- Cobley, 745.
- Ellis, 812.
- Ellis, 945.

Lime stannate. *See* Stannates.

Lime sulphate, making or preparing:
- Henry, 87.
- Spence, 121.
- Samuel, 145.
- Binks, 149.
- Gregson, 215.
- Birkmyre, 258.
- Laming and Evans, 286.
- De Douhet, 291.
- Liebhaber, 300.
- Gossage, 301.
- Clausen, 316.
- Price, 330.
- Watson and Slater, 339.
- Laming, 347.
- Floret, 348.
- Cartwright, 356.
- Binks, 376.
- Carter and Marriott, 377.
- Condy, 401.
- Price, 422.
- Bell and Schofield, 425.
- Johnson (*Rich*), 434.
- Fontainemoreau, 437.
- Margueritte, 437.
- Beatson, 473.

Lime sulphate, making or preparing—*cont.*
    Moll, 476.
    Ellis, 490.
    Condy, 496.
    Gossage, 506.
    Deacon, 555.
    Barham, 568.
    Possoz, 598.
    Emerson, 606.
    Orioli, 636.
    Manbré, 639.
    Wrightson, 643.
    Henderson, 668.
    Webster, 691.
    Wheeler, 695.
    Townsend and Walker, 714.
    Townsend and Walker, 721.
    Stanford, 738.
    Oliver, Grantham, Sinnock, and Leverson, 754.
    Brooman (*Leplay and Cuisinier*), 765.
    Bischof, 773.
    Duncan, 774.
    Abel (*Taillandier*), 780.
    Schnell (*Mond*), 803.
    Clapham, 844.
    Hills, 881.
    Clark (*Lesieur*), 891.
    Leverson (*Oliver*), 913.
    Hunter, 927.
    Chaudet, 939.
    Bernhard (*Lagrange*), 943.
    Weldon, 972.
    Martin, 977.
    Weldon, 997.
    De Wissocq and Krasinski, 1016.

Lime sulphide or sulphuret. *See* Calcium sulphide.

Lime tannate or tannite. *See* Tannic acid.

Lime tartrate. *See* Tartaric acid.

Lime tungstate. *See* Tungstic acid.

Lime water:
    Crooks, 50.
    Tobin, 984.
    Davis, 1002.

Lime and manganese:
    Balmain, 446.

Limestone, burning. *See* Lime, making.

Litharge. *See* Lead oxides.

Liver of sulphur. *See* Soda sulphide or sulphuret.

Luzerine, obtaining or producing:
    Weatherdon (*Caminade*), 978.

Magnesia, making or obtaining:
    Crooks, 55.
    Henry, 87.
    Grisenthwaite, 101.
    Wilson, 146.
    Pattinson, 186.
    Gregson, 215.
    Hills, 227.
    Tilghman, 248.
    De Sussex, 249.
    Richardson, 283.
    Fontainemoreau, 292.
    Richardson, 313.
    Hills, 314.
    Laming, 347.
    Oliver, 363.
    Tilghman, 458.
    Henderson, 548.
    Newton (*Le Chatelier*), 619.
    Henderson and Down, 700.
    Cobley, 710.
    Jullion, 724.
    Sonstadt, 819.
    Brooman (*Burnet*), 835.
    Baggs and Simpson, 838.
    Clapham, 839.
    Clemm, 845.
    Weldon, 971.
    Weldon, 972.
    Weldon, 987.
    Weldon, 997.

Magnesia arseniates or arsenites. *See* Arseniates.

Magnesia borates. *See* Boracic acid.

Magnesia carbides. *See* Magnesia carbonate.

Magnesia carbonates and bicarbonates, making or obtaining:
    Wilson, 146.
    Croll, 159.
    Pattinson, 186.
    Hills, 227.
    Laming, 256.
    Laming and Evans, 286.
    Richardson, 313.
    Murdoch, 361.
    Richardson, 378.
    Gwynne, J. and J. E. A. 395.

Magnesia carbonates and bicarbonates, making or obtaining—*cont.*
- Gossage, 506.
- Clark (*Martin*), 602.
- Emerson, 606.
- Jullion, 724.
- Sonstadt, 819.
- Henderson, 824.
- Readman, 829.
- Baggs and Simpson, 838.
- Laming, 863.
- Weldon, 971.

Magnesia chlorate. *See* Magnesia chloride.

Magnesia chloride:
- Tennant, 54.
- Henry, 87.
- Watt, 309.
- Oliver, Grantham, Sinnock, and Leverson, 754.
- Routledge and Richardson, 933.

Magnesia hypochloride. *See* Magnesia chloride.

Magnesia hypochlorite. *See* Magnesia chloride.

Magnesia hyposulphate and sulphite:
- Smith and McDougall, 402.
- Bell, 649.
- Townsend and Walker, 714.
- Townsend and Walker, 721.
- Jullion, 724.
- Clemm, 845.

Magnesia nitrates and nitrites:
- Crane and Jullion, 260.
- Watt, 309.
- Newton, 563.

Magnesia phosphates, making or obtaining:
- Laming, 347.
- Richardson, 373.
- Smith and McDougall, 402.
- Ritterbandt, 519.
- Henderson, 548.
- Emerson, 606.
- Wrightson, 643.
- Kernot and Rucker, 756.
- Brooman (*Leplay and Cuisinier*), 765.
- Johnson (*Pollak*), 876.
- Clark (*Lesieur*), 891.
- Martin, 977.

Magnesia silicates:
- Henderson, 548.
- Clark (*Martin*), 602.
- Cobley, 745.
- Ellis, 812.
- Ellis, 945.

Magnesia sulphate, making o
obtaining:
- Dundonald, 52.
- Henry, 87.
- Ledsam, 99.
- Grisenthwaite, 101.
- Croll, 159.
- Gregson, 177.
- Pattinson, 186.
- Gregson, 215.
- Ward, 238.
- De Sussex, 249.
- De Sussex, 252.
- Laming, 256.
- Richardson, 283.
- Richardson, 313.
- Laming, 347.
- Binks, 376.
- Richardson, 378.
- Beatson, 473
- Moll, 476.
- Gossage, 506.
- Baker, 525.
- Henderson, 548.
- Emerson, 606.
- Bell, 649.
- Newton (*Le Chatelier*), 70
- Townsend and Walker, 71
- Jullion, 724.
- Bischof, 773.
- Clapham, 839.
- Clemm, 845.
- Christian, Charlton, and Charlton, 919.
- Weldon, 971.
- Weldon, 997.

Magnesia and alumina. *Se*
Aluminates.

Magnesia and ammonia sulphate:
- Richardson, 283.
- Ritterbandt, 519.

Magnesia stannate. *See* Stannates.

Magnesia tungstate. *Se*
Tungstic acid.

Magnesian limestone, use of:
- Henry, 87.
- Ledsam, 99.
- Grisenthwaite, 101.
- Gregson, 177.
- Sewell, 179.

Magnesian limestone, use of—*cont.*
  Pattinson, 186.
  Gregson, 215.
  De Sussex, 252.
  Laming, 256.
  Laming and Evans, 286.
  Richardson, 313.
  Laming, 347.
  Oliver, 363.
  Smith and McDougall, 402.
  Baker, 525.
  Newton, 563.
  Bell, 649.
  Richardson, 685.
  Cobley, 704.
  Oliver, Grantham, Sinnock, and Leverson, 754.
  Price, 911.
  Christian, Charlton, and Charlton, 919.
  Davis, 1002.

Magnesium, making:
  Sonstadt, 819.

Magnesium chloride or muriate, making or obtaining:
  Wilson, 146.
  Croll, 159.
  De Sussex, 249.
  De Sussex, 252.
  Laming, 256.
  Richardson, 313.
  Oliver, 363.
  Elliot, 415.
  Price, 422.
  Symonds, 523.
  Henderson, 548.
  Emerson, 606.
  Mennons (*De Siebenthal*), 613.
  Richardson and Prentice, 662.
  Binks and Macqueen, 672.
  Henderson and Down, 700.
  Hughes and Richardson, 761.
  Sonstadt, 819.
  Clapham, 839.
  Clemm, 845.
  Christian, Charlton, and Charlton, 919.
  Weldon, 971.
  Weldon, 997.

Magnesium cyanide:
  Hills, 1022 (*Appendix*).

Magnesium fluoride. *See* Fluorine.

Magnesium sulphide or sulphuret:
  Ward, 238.

Magnesium sulphide or sulphuret—*cont.*
  Richardson, 283.
  Laming, 347.
  Jullion, 724.
  Brooman (*Burnet*), 835.

Malachite, use of:
  Gerland, 765.
  Gerland, 788.

Manganates and permanganates, making or obtaining:
  Condy, 496.
  Vogt (*Schad*), 873.
  Brooman (*Maréchal and Tessie du Motay*), 964.
  Brooman (*Maréchal and Tessie du Motay*), 994.
  Price (*Blügel*), 1011.

Manganese benzoate. *See* Benzoic acid.

Manganese borate. *See* Boracic acid.

Manganese carbonate, making or obtaining:
  Binks, 149.
  Laming, 256.
  Gwynne, J. and J. E. A., 395.
  Dunlop, 453.
  Gossage, 462.
  Dunlop, 471.
  Stott, 472.
  Binks and Macqueen, 672.
  Paterson, 778.
  Weldon, 987.

Manganese chloride, making or obtaining:
  Gossage, 130.
  Binks, 149.
  Croll, 172.
  Walters, 197.
  Hunt, 436.
  Barrow, 477.
  Elliot, 503.
  Henderson, 614.
  Dales, 640.
  Binks, 683.
  Binks, 719.
  Down, 730.
  Newton (*Morin*), 740.
  Binks, 786.
  Binks, 820.
  Deane, 974.
  Marçais, 989.

Manganese, colours from:
  Newton (*Morin*), 740.
  Vogt (*Schad*), 873.

Manganese nitrate:
- Down, 730.

Manganese peroxide, making or recovering:
- Wright, 101.
- Gossage, 130.
- Binks, 149.
- Walters, 197.
- De Sussex and Arrott, 211.
- Longmaid, 226.
- De Sussex, 249.
- Glover, 379.
- Haeffely, 409.
- Hunt, 436.
- Blythe and Kopp, 442.
- Balmain, 446.
- Dunlop, 453.
- Gossage, 461.
- Dunlop, 471.
- Barrow, 473.
- Barrow, 477.
- Elliot and Pattinson, 484.
- Elliot, 503.
- Pattinson, 505.
- Cook, 505.
- Gossage, 506.
- Muspratt and Gerland, 511.
- Gossage, 526.
- Muspratt and Gerland, 536.
- Gatty, 545.
- Richardson, 551.
- Blair, 564.
- Haeffely, 584.
- Laming, 634.
- Parker, 641.
- Binks and Macqueen, 672.
- Hunter, 676.
- Binks, 683.
- Laming and Smith, 694.
- Binks, 717.
- Clark (*Margueritte and De Sourdeval*), 779.
- Binks, 786.
- Clapham, 839.
- Deane, 974.
- Weldon, 997.
- Clark (*Cotelle*), 1000.
- Bousfield (*Hofmann*), 1005.

Manganese protoxide, making or obtaining:
- Gossage, 130.
- Watt and Tebbutt, 135.
- Binks, 149.
- Croll, 172.
- Walters, 197.
- De Sussex, 249.
- Laming, 256.
- Fontainmoreau, 292.
- Richardson, 378.
- Dunlop, 453.
- Bellford (*Kuhlmann*), 456.
- Dunlop, 471.
- Stott, 472.

Manganese protoxide, making or obtaining—*cont.*
- Elliot and Pattinson, 484.
- Spilsbury, 485.
- Elliot, 503.
- Pattinson, 505.
- Muspratt and Gerland, 511.
- Muspratt and Gerland, 536.
- Deacon, 581.
- Laming, 600.
- Arrott, 629.
- Laming, 634.
- Spencer, 642.
- Hunter, 676.
- Binks, 683.
- Townsend and Walker, 687.
- Townsend and Walker, 714.
- Binks, 718.
- Newton (*Morin*), 749.
- Henderson, 824.
- Brooman (*Burnet*), 835.
- Clapham, 839.
- Crockford, 849.
- Weldon, 997.

Manganese resinate:
- Murdoch, 346.

Manganese sulphate, making or obtaining:
- Binks, 149.
- Croll, 172.
- Walters, 197.
- De Sussex, 249.
- Binks, 377.
- Barrow, 477.
- Spilsbury, 580.
- Henderson, 631.
- Down, 730.
- Lunge, 961.
- Weldon, 987.
- Bousfield (*Hofmann*), 1005.

Manganese sulphide or sulphuret, making or obtaining:
- Binks, 149.
- Croll, 172.
- De Sussex and Arrott, 211.
- Pattinson, 385.
- Laming, 389.
- Blythe and Kopp, 442.
- Bellford (*Kuhlmann*), 456.
- Stott, 472.
- Barrow, 473.
- Gossage, 506.
- Clark, 507.
- Musprat and Gerland, 511.
- Gossage, 526.
- Deacon, 581.
- Gossage, 595.
- Laming, 600.
- Spencer, 617.
- Arrott, 629.
- Spencer, 642.
- Laming, 645.

Manganese sulphide or sulphuret, making or obtaining—*cont.*
- Laming and Smith, 684.
- Townsend and Walker, 687.
- Townsend and Walker, 714.
- Seitz, 691.
- Paterson, 778.
- Walker, 806.
- Brooman (*Burnet*), 835.
- Lunge, 981.
- Weldon, 987.
- Bousfield (*Hofmann*), 1005.

Margaric acid and margarates:
- Moinier, 404.

Massicot. *See* Lead oxides.

Mercury chlorides:
- Thomson, 181.
- Corbelli (*Riatti*), 568.

Mercury, fulminating:
- Meyer, A. and M. (*Gerhardt*), 920.

Mercury iodide. *See* Iodine.

Metagallic acid. *See* Tannic acid.

Metals, their oxides and salts, use of, in purifying gas:
- Croll, 172.
- Cormack, 219.
- Hills, 227.
- Johnson, 233.
- Hills, 240.
- Laming, 256.
- Hills, 1022 (*Appendix*).
- Cormack, 284.
- Laming and Evans, 286.
- Michiels, 289.
- Lowe and Evans, 312.
- Lowe and Evans, 313.
- Losh, 321.
- Kirkham, J. and T. N., 324.
- Laming, 325.
- Chisholm, 375.
- Laming, 389.
- Bowditch, 400.
- Laming, 475.
- Stott, 492.
- Laming, 523.
- Maltby, 538.
- Croll, 539.
- Spencer, 558.
- Boulton, 567.
- Greenshields, 572.
- Evans, 587.
- Laming, 600.
- Laming, 634.
- Parker, 641.
- Wrightson, 643.

Metals, their oxides and salts, use of, in purifying gas—*cont.*
- Hills, 650.
- Wrightson, 665.
- Croll, 677.
- Keates, 681.
- Richardson, 685.
- Leslie, 686.
- Smith, 742.
- Richardson, 755.
- Cleland, 768.
- Warner, 791.
- Fox, 822.
- Baggs and Simpson, 838.
- Laming, 863.
- Hills, 881.
- Richardson and Rücker, 931.
- Lunge, 981.

Methyl iodides. *See* Iodine.

Minium. *See* Lead oxides.

Molybdenum phosphates:
- Paul, 529.

Mordants, making or preparing:
- Ashworth, 61.
- Hendricks, 109.
- Greenwood, Mercer, and Barnes, 225.
- Young, 270.
- Rowlandson, 273.
- Mercer and Blyth, 280.
- Swindells, 299.
- Richardson, 319.
- Swindells and Nicholson, 334.
- Higgin, 372.
- Haeffely, 409.
- Higgin, 413.
- Kuczynski, 418.
- Pochin, 440.
- Dale, 463.
- Spilsbury, 465.
- Johnson, 470.
- Gedge (*Dauriac*), 489.
- Johnson (*Tussy de Montluc and Gauthier*), 494.
- Barcroft, 532.
- Norris, 540.
- Drouet, 562.
- Roberts and Dale, 594.
- Newton (*Le Chatelier*), 619.
- Emerson, 624.
- Townsend and Walker, 721.
- Noble, 801.
- Ellis, 812.
- Lepainteur, 823.
- Powers and Dale, 825.
- Lightfoot, Barnes, and Lightfoot, 873.
- Chaudet, 939.
- Ellis, 945.

Morphia. *See* Alkaloids.

Muriatic acid. *See* Hydrochloric acid.

Nickel arsenides or arsenurets;
Vivian, 311.

Nickel carbonates:
Muspratt and Gerland, 536.

Nickel chlorides:
Dahll, 665.
Down, 730.
Gerland, 788.
Chetwynd (*De Secqueville*), 965.

Nickel nitrates:
Down, 730.

Nickel oxalates. *See* Oxalates.

Nickel oxides:
Newton, 537.

Nickel sulphates:
Newton, 537.
Dahll, 665.
Down, 730.

Nickel sulphides or sulphurets:
Muspratt and Gerland, 511.
Muspratt and Gerland, 536.
Dufrené (*De Secqueville*), 937.
Claudet, 1009.

Nitrates (generally), making:
Crane and Jullion, 260.
Ecarnot, 282.
Claussen, 316.
Roberts, 323.

Nitre, making. *See* Potash nitrate.

Nitric acid, making or obtaining:
Wilson, 85.
Hemming, 123.
Hunt, 164.
De Sussex, 238.
Jullion, 243.
Reade, 244.
De Sussex, 249.
Dunlop, 251.
Crane and Jullion, 260.
McDougal and Rawson, 269.
Young, 270
Ecarnot, 282.
Fontainmoreau, 292.
Watt, 309.
Claussen, 316.
Roberts, 323.

Nitric acid, making or obtaining—*cont.*
Petrie, 328.
Swindells and Nicholson, 334.
Emerson, 362.
Richardson, 373.
Plisson, 417.
Fontainmoreau, 437.
Johnson (*Persoz*), 450.
Bellford (*Kuhlmann*), 456.
Radley, 498.
Petrie, 499.
Clark, 507.
Kenyon, 541.
Newton (*Cooper*), 613.
Newton (*Lefebre*), 622.
Webster, 709.
Malcolm, 732.
Brooman (*Aubertin*), 760.
Webster, 810.
Mond, 811.
Ogston, 818.
Baggs and Simpson, 838.
Stille, 844.
Baggs and Simpson, 902.
Lake (*Bell, and Fell, T. M. and A. G.*), 994.
Newton (*Baker, Poole, and Stace*), 998.
Hughes (*Large*), 1001.
Weldon, 1007.
Lake (*Bell, and Fell, T. M. and A. G.*), 1014.
Baggs, 1018.

Nitric acid, residues from manufacture, use of:
Dufrené (*De Sequeville*), 937.
Chetwynd (*De Sequeville*), 965.

Nitrobenzine residues, use of:
Clark (*Dehaut*), 952.

Nitrogen, making or obtaining:
Binks, 149.
Newton, 204.
Swindells, 209.
Barlow, 281.
Harris, 405.
Malcolm, 732.
Mond, 811.
Leigh, 825.
Dufrené (*Tellier*), 938.

Nitrogen deutoxide. *See* Nitrous vapours.

Nitrogen oxide. *See* Nitrous vapours.

Nitro-sulphuric acid:
De la Peyrouse, 734.

Nitrous vapours, producing :

- Sautter, 196.
- Duclos de Boussois, 200.
- Turner, 210.
- Jullion, 243.
- Dunlop, 251.
- Birkmyre, 258.
- Crane and Jullion, 260.
- McDougall and Rawson, 269.
- Young, 271.
- Ecarnot, 282.
- Roberts, 323.
- Swindells and Nicholson, 334.
- Watson and Slater, 339.
- Henderson, 354.
- Emerson, 362.
- Von Seckendorf, 433.
- Johnson (*Persoz*), 450.
- Holland, 452.
- Dale, 465.
- Gossage, 484.
- Firmin, 486.
- Petrie, 499.
- Clark, 508.
- Gossage, 519.
- Gossage, 521.
- Oliver, 530.
- Gatty, 545.
- Jennings, 560.
- Hills, 561.
- Imeary and Richardson, 576.
- Gossage, 591.
- Roberts and Dale, 594.
- Theroulde, 598.
- Gossage, 608.
- Henderson, 652.
- Newton (*Le Chatelier*), 706.
- Cobley, 718.
- Mease, 719.
- Malcolm, 732.
- Laing and Cossins, 748.
- Tolhausen (*Rousse*), 751.
- Webster, 758.
- Johnson (*Barton*), 783.
- De la Perouse, 784.
- Dickson, 793.
- Webster, 810.
- Mond, 811.
- Ogston, 818.
- Brooman (*Burnet*), 835.
- Forbes, 894.
- Baggs and Simpson, 902.
- Lockey, 942.
- Chetwynd (*De Secqueville*), 965.
- Hughes (*Large*), 1001.
- Bousfield (*Hofmann*), 1005.

Oil of vitriol. *See* Sulphuric acid.

Opium, treating. *See* Alkaloids.

Orpiment. *See* Arsenic sulphide.

Oxalates or binoxalates, making or obtaining :

- Samuel, 145.
- Binks, 230.
- Turner, 234.
- Jullion, 243.
- Firmin, 306.
- Bell and Schofield, 426.
- Johnson (*Rich*), 434.
- Margueritte, 437.
- Roberts, Dale, and Pritchard, 510.
- Roberts, Dale, and Pritchard, 515.
- Muspratt and Gerland, 536.
- Possoz, 598.
- Lorberg, 728.
- Walsh, 842.
- Newton (*Bang*), 909.
- Weldon, 972.
- Paraf, 1003.
- Wanklyn, 1003.
- Bonneville (*Hebert*), 1016.

Oxalic acid, making or obtaining :

- Barsham, 113.
- Samuel, 145.
- Nyren, 171.
- Binks, 230.
- Turner, 234.
- Jullion, 243.
- Crane and Jullion, 260.
- Laming, 263.
- McDougal and Rawson, 269.
- Ecarnot, 281.
- Swindells and Nicholson, 334.
- Bellford, 395.
- Margueritte, 437.
- Dale, 465.
- Firmin, 486.
- Petrie, 499.
- Roberts, Dale, and Pritchard, 510.
- Roberts, Dale, and Pritchard, 515.
- Possoz, 598.
- Ogston, 818.
- Leigh, 825.
- Walsh, 842.
- Laurent, Casthelaz, and Basset, 918.
- Casthelaz and Basset, 946.
- Weldon, 972.
- Hills, 998.
- Paraf, 1003.
- Wanklyn, 1003.

Oxygen gas, making or obtaining :

- White, 276.

Oxygen gas, making or obtaining—*cont.*
- **Watt, 309.**
- **Swindells and Nicholson, 334.**
- Michiels, 350.
- Geyelin, 370.
- Trueman, 416.
- Johnson (*Persoz*), 450.
- Clark, 507.
- Drouet and Le Coq, 562.
- Newton (*Lefebvre*), 622.
- Bower, 677.
- Binks, 683.
- Standley, 694.
- Webster, 709.
- Binks, 717.
- Malcolm, 732.
- Webster, 732.
- Webster, 758.
- Binks, 786.
- Dickson, 801.
- Mond, 811.
- Binks, 820.
- Clark (*Achereau*), 886.
- Parker and Tanner, 913.
- Dufrené (*Tellier*), 938.
- Mallet, 956.
- Brooman (*Maréchal and Tessie du Motay*), 964.
- Rowland, 986.
- Rowbotham, 1001.
- Mallet, 1015.

Oxygenated muriatic gas. *See* Chlorine.

Oxymuriatic acid. *See* Chlorine.

Ozone, making:
- Bell, 322.

Pamphyteic acid:
- Henry (*Obert, Vasseur, and Houbigant*), 679.
- Johnson (*Obert*), 687.

Paper making, &c., use of fluids from:
- McCrummen, 585.
- Henry (*Obert, Vasseur, and Houbigant*), 679.
- De la Provotais, 747.
- Henry (*Vasseur and Lamotte*), 781.
- Baggs and Simpson, 785.
- Richardson and Irvine, 843.
- Clark (*Gélis and Dusart*), 854.
- Chadwick and Clench, 868.
- Clark (*Orioli, Fredet, and Matussière*), 914.
- Routledge, 916.

Paper making, &c., use of fluids from—*cont.*
- **Routledge and Richardson, 921.**
- Potter, 925.
- Clark (*Negret, Orioli, and Fredet*), 928.
- Routledge and Richardson, 933.
- Clark (*Negret, Orioli, and Fredet*), 950.
- Wright (*Porion*), 954.
- Clark (*Gégnon and Gagnage*), 955.
- Baker (*Collyer*), 958.
- Routledge, Richardson, and Richardson, 975.
- Amos and Anderson, 976.
- Weatherdon (*Caminade*), 978.

Paris plaster. *See* Lime sulphate.

Peat, use of, in making gas:
- Warburton, 86.
- Hills, 240.
- Hills, 1022 (*Appendix*).
- Bellford, 336.
- Aymard (*Soloman*), 366.
- Chisholm, 375.
- Keates, 681.
- Clark (*Archereau*), 886.

Pearl ash. *See* Potash.

Phenic acid and its salts and compounds, making or obtaining:
- **Solomons and Azulay, 263.**
- Stones, 285.
- Smith and McDougall, 403.
- Bobœuf, 541.
- Henry (*Obert, Vasseur, and Houbigant*), 679.
- Bobœuf, 756.
- Barrow, 759.
- Clark (*Lavigne*), 811.
- Schlumberger (*Müller*), 829.
- Lee, 875.
- Bowditch, 922.
- **Law, 996.**

Phosphoric acid, making or obtaining:
- **Richardson, 373.**
- Mautrand, 419.
- Margueritte, 434.
- Newton (*Horsford*), 485.
- Newton (*Horsford*), 501.
- **Bessemer, 553.**
- **Emerson, 606.**
- **Gerland, 849.**
- **Leverson (*Oliver*), 913.**

Phosphoric acid, making or obtaining—*cont.*
- Player, 973.
- Martin, 977.

Phosphorus, making or obtaining:
- Albright (*Shrotter*), 307.
- Mantrand, 419.
- Binks, 518.
- Laming, 523.
- Bessemer, 553.
- Emerson, 606.
- Johnson (*Muller*), 762.
- Brooman (*Aubertin*), 901.
- Leverson (*Oliver*), 913.
- Player, 973.
- Martin, 977.
- Norrington, 1020.

Phthalic acid and compounds:
- Laurent and Casthelaz, 915.
- Laurent and Casthelaz, 934.

Picric acid, making or obtaining:
- Dale, 465.
- Roberts and Dale, 594.
- Henry (*Obert, Vasseur, and Houbigant*), 679.
- De la Provotais, 747.
- Henry (*Vasseur and Lamotte*), 781.
- Henry (*Vasseur and Janssens*), 801.
- Clark (*Orioli, Predet, and Malassiére*), 914.

Plaster of Paris. *See* Lime sulphate.

Plumbates:
- Haeffeley, 409.
- Paul, 529.

Potash (hydrate or caustic), making or obtaining:
- Harewell, Ralegh, Williams, and Clark, 1.
- Hutchinson, 5.
- Semiens, 8.
- Hinton, 9.
- Jewers and Lodge, 16.
- Baker and Barker, 17.
- Heys, 22.
- Shannon, 25.
- Mitchell, 27.
- Fordyce, 30.
- Collison, 31.
- Gerard, 31.
- Heys, 32.
- Glenny, 38.
- Taylor, C. and G., 39.
- Dundonald, 44.

Potash (hydrate or caustic), making or obtaining—*cont.*
- Carpenter, 1024 (*Appendix*).
- Hoaklesy, 48.
- Hodson, 48.
- Shannon, 53.
- Howard, 57.
- Newstead, 62.
- Clayfield, 66.
- Hodson, 69.
- Hodson, 76.
- De Berenger, 78.
- Dundonald, 78.
- Turner and Angel, 91.
- Hunt, 164.
- Turner, 193.
- Turner, 219.
- Simpson, 226.
- De Sussex, 238.
- Tilghman, 248.
- Rotch, 297.
- Elliot, 302.
- Clift, 303.
- Taylor, 303.
- Watt, 309.
- Lowe and Evans, 312.
- Boulton, 317.
- Nation and Dyer, 356.
- Bursill, 359.
- McDougall, 387.
- Cowper (*Laureau*), 407.
- Margueritte, 435.
- Margueritte, 437.
- Tilghman, 458.
- Lurig, 482.
- Balmain and Colby, 483.
- Fontainemoreau (*Selmi*), 502.
- Newton, 514.
- Gossage, 526.
- Bakewell, 547.
- Thompson, 547.
- Gossage, 554.
- Deacon, 555.
- Deacon, 558.
- Newton (*Le Chatelier*), 566.
- Deacon, 568.
- Newton, 574.
- Deacon, 581.
- Henry, 586.
- Gossage, 591.
- Thomas, C. J. T., H., and C., 596.
- Possoz, 598.
- Dale, 609.
- Seymour (*Le Play*), 611.
- Gossage, 623.
- Bakewell (*Pemberton*), 638.
- Henderson, 663.
- Standley, 694.
- Hunter, 702.
- Townsend and Walker, 714.
- Webster, 732.
- Cobley, 745.
- Maillard, 753.
- Webster, 758.
- Brooman (*Aubertin*), 769.

Potash (hydrate or caustic), making or obtaining—*cont.*

- Balmain, 764.
- Gossage, 775.
- Henry (*Vasseur and Lamotte*), 781.
- Johnson (*Burton*), 783.
- Baggs and Simpson, 785.
- Dickson, 793.
- Gossage, 795.
- Walker, 806.
- Webster, 810.
- Powers and Dale, 825.
- Brooman (*Burnet*), 835.
- Thornthwaite, 867.
- Shanks, 870.
- Doughty, 879.
- Brooman (*Aubertin*), 901.
- Moride, 906.
- Hunter, 909.
- Routledge, 916.
- Routledge and Richardson, 921.
- Bowditch, 922.
- Nicholson, 923.
- Walsh, 925.
- Hunter, 927.
- Routledge and Richardson, 933.
- Wright, 954.
- Routledge, Richardson, and Richardson, 975.
- Woods, 993.
- Davis, 1002.
- Shaw, 1006.

Potash acetates :

- Newton (*Le Chatelier*), 588.
- Possoz, 598.
- Buchholz, 698.
- Cobley, 718.
- Dickson, 793.

Potash aluminates. *See* Aluminates.

Potash arseniates or arsenites. *See* Arseniates.

Potash bi-carbonate :

- Turner, 193.
- Johnson, 423.
- Bell, 551.
- Verstraet and Olivier, 802.
- Ozouf, 891.
- Hunter, 909.
- Hunter, 927.
- Lunge, 981.
- Newton (*Baker, Poole, and Stace*), 998.

Potash borate. *See* Boracic acid.

Potash carbides. *See* Potash carbonates.

Potash carbonates, making or obtaining :

- Heys, 32.
- Glenny, 38.
- Dundonald, 44.
- Hately, 46.
- Hodson, 48.
- Hodson, 60.
- Clayfield, 66.
- Phelps, 67.
- Hodson, 76.
- De Bereuger, 78.
- Dundonald, 78.
- Attwood, 90.
- MacLeod, 102.
- Fowler, 143.
- Hunt, 164.
- Clough, 182.
- Turner, 193.
- Turner, 219.
- Hills, 240.
- De Douhet, 291.
- Gatty, 293.
- Spence, 298.
- Elliot, 302.
- Taylor, 303.
- Watt, 309.
- Boulton, 317.
- Bellford, 336.
- Werckshagen, 358.
- Bursill, 359.
- Bohringer and Clemm, 370.
- Gwynne, J. and J. E. A., 395.
- Bramwell, 421.
- Johnson, 423.
- Margueritte, 335.
- Margueritte, 437.
- Lürig, 482.
- Balmain and Colby, 483.
- Barruel, 489.
- Newton, 514.
- Bell, 551.
- Ward (*Wynants*), 559.
- Newton (*Le Chatelier*), 566.
- McCrummen, 585.
- Possoz, 598.
- Emerson, 606.
- Dale, 609.
- Gossage, 612.
- Gossage, 622.
- Maumene and Rogelet, 633.
- Bush, 638.
- Bush, 661.
- Henderson, 668.
- Hunter, 702.
- Clark (*Margueritte and De Sourdeval*), 735.
- Laming (*Laming*), 738.
- Cobley, 745.
- Maillard, 753.
- Johnson (*Burton*), 783.

Potash carbonates, making or obtaining—*cont.*
- Dickson, 793.
- Gossage, 795.
- Verstraet and Olivier, 802.
- Powers and Dale, 825.
- Brooman (*Burnet*), 835.
- Clark (*Gélis and Dusart*), 854.
- De Wylde, 856.
- Lorberg, 856.
- Ozouf, 891.
- Brooman (*Aubertin*), 901.
- Moride, 906.
- Hunter, 909.
- Routledge, 916.
- Claus, 919.
- Routledge and Richardson, 921.
- Bowditch, 922.
- Walsh, 925.
- Hunter, 927.
- Routledge and Richardson, 933.
- Claus, 935.
- Baker (*Collyer*), 958.
- Routledge, Richardson, and Richardson, 975.
- Lunge, 981.
- Newton (*Baker, Poole, and Stace*), 998.
- Williamson, 1017.

Potash chlorates. *See* Potash chlorides.

Potash chlorides:
- Watt, 309.
- Drouet and Coq, 562.
- Hunter, 927.
- Routledge and Richardson, 933.

Potash chromates. *See* Chromic acid.

Potash citrate. *See* Citric acid.

Potash ferrate or ferrite:
- Lowe and Evans, 312.
- Brooman (*Marechal and Tessie du Motay*), 964.

Potash hypochlorides or hypochlorites. *See* Potash chlorides.

Potash hyposulphate, hyposulphite, or sulphite, making or obtaining:
- Laming, 325.

Potash hyposulphate, hyposulphite, or sulghite, making or obtaining—*cont.*
- Hübner, 412.
- Richardson and Prentice, 662.
- Townsend and Walker, 714.
- Townsend and Walker, 721.
- Drevet, 722.
- Dickson, 793.
- Brooman (*Burnet*), 835.
- Price, 924.

Potash manganate or permanganate. *See* Manganates.

Potash nitrate or nitrites, making or obtaining:
- Ramseye, 2.
- Wardour, 2.
- Price, Wardour, Barry, and Nutt, 6.
- Harris, 11.
- Linden, 14.
- Nightingale, 17.
- Price, 18.
- Van Haake, 21.
- De Bruges, 22.
- Mantill, 23.
- Dundonald, 52.
- Dundonald, 78.
- Croll, 139.
- Sautter, 196.
- Hills, 240.
- De Sussex, 249.
- White, 276.
- Rotch, 297.
- Watt, 309.
- Petrie, 328.
- Price, 330.
- Watson and Slater, 339.
- Staite, 362.
- Moinier, 404.
- Newton, 420.
- Wagstaffe and Perkins, 425.
- Dale, 465.
- Lürig, 482.
- Macallum, 505.
- Fraser, 552.
- Drouet and Le Coq, 562.
- Fraser, 573.
- Newton, 574.
- Gilbee, 584.
- Henry, 586.
- Roberts and Dale, 594.
- Thoroulde, 598.
- Newton (*Cooper*), 613.
- Newton (*Lefebvre*), 622.
- Richardson, 648.
- Henderson, 668.
- Webster, 709.
- Webster, 732.
- Hughes and Richardson, 761.
- Henry (*Vasseur and Lamotte*), 781.

Potash (hydrate or caustic), making or obtaining—*cont.*
  Balmain, 764.
  Gossage, 775.
  Henry (*Vasseur and Lamotte*), 781.
  Johnson (*Burton*), 783.
  Baggs and Simpson, 785.
  Dickson, 793.
  Gossage, 795.
  Walker, 806.
  Webster, 810.
  Powers and Dale, 825.
  Brooman (*Burnet*), 835.
  Thornthwaite, 867.
  Shanks, 870.
  Doughty, 879.
  Brooman (*Aubertin*), 901.
  Moride, 906.
  Hunter, 909.
  Routledge, 916.
  Routledge and Richardson, 921.
  Bowditch, 922.
  Nicholson, 923.
  Walsh, 925.
  Hunter, 927.
  Routledge and Richardson, 933.
  Wright, 954.
  Routledge, Richardson, and Richardson, 975.
  Woods, 993.
  Davis, 1002.
  Shaw, 1006.

Potash acetates :
  Newton (*Le Chatelier*), 588.
  Possoz, 598.
  Buchholz, 698.
  Cobley, 718.
  Dickson, 793.

Potash aluminates. *See* Aluminates.

Potash arseniates or arsenites. *See* Arseniates.

Potash bi-carbonate :
  Turner, 193.
  Johnson, 423.
  Bell, 551.
  Verstraet and Olivier, 802.
  Ozouf, 891.
  Hunter, 909.
  Hunter, 927.
  Lunge, 981.
  Newton (*Baker, Poole, and Stace*), 998.

Potash borate. *See* Boracic acid.

Potash carbides. *See* Potash carbonates.

Potash carbonates, making or obtaining :
  Heys, 32.
  Glenny, 38.
  Dundonald, 44.
  Hately, 46.
  Hodson, 48.
  Hodson, 60.
  Clayfield, 66.
  Phelps, 67.
  Hodson, 76.
  De Berenger, 78.
  Dundonald, 78.
  Attwood, 90.
  MacLeod, 102.
  Fowler, 143.
  Hunt, 164.
  Clough, 182.
  Turner, 193.
  Turner, 219.
  Hills, 240.
  De Doubet, 291.
  Gatty, 293.
  Spence, 298.
  Elliot, 302.
  Taylor, 303.
  Watt, 309.
  Boulton, 317.
  Bellford, 336.
  Werckshagen, 358.
  Bursill, 359.
  Bohringer and Clemm, 370.
  Gwynne, J. and J. E. A., 395.
  Bramwell, 421.
  Johnson, 423.
  Margueritte, 335.
  Margueritte, 437.
  Lürig, 482.
  Balmain and Colby, 483.
  Barruel, 489.
  Newton, 514.
  Bell, 551.
  Ward (*Wynants*), 559.
  Newton (*Le Chatelier*), 566.
  McCrummen, 585.
  Possoz, 598.
  Emerson, 606.
  Dale, 609.
  Gossage, 612.
  Gossage, 622.
  Maumene and Rogelet, 633.
  Bush, 638.
  Bush, 661.
  Henderson, 668.
  Hunter, 702.
  Clark (*Margueritte and De Sourdeval*), 735.
  Laming (*Laming*), 738.
  Cobley, 745.
  Maillard, 753.
  Johnson (*Burton*), 783.

Potash carbonates, making or obtaining—*cont.*
- Dickson, 793.
- Gossage, 795.
- Verstraet and Olivier, 802.
- Powers and Dale, 825.
- Brooman (*Burnet*), 835.
- Clark (*Gélis and Dusart*), 854.
- De Wylde, 856.
- Lorberg, 856.
- Ozouf, 891.
- Brooman (*Aubertin*), 901.
- Moride, 906.
- Hunter, 909.
- Routledge, 916.
- Claus, 919.
- Routledge and Richardson, 921.
- Bowditch, 922.
- Walsh, 925.
- Hunter, 927.
- Routledge and Richardson, 933.
- Claus, 935.
- Baker (*Collyer*), 958.
- Routledge, Richardson, and Richardson, 975.
- Lunge, 981.
- Newton (*Baker, Poole, and Stace*), 998.
- Williamson, 1017.

Potash chlorates. *See* Potash chlorides.

Potash chlorides:
- Watt, 309.
- Drouet and Coq, 562.
- Hunter, 927.
- Routledge and Richardson, 933.

Potash chromates. *See* Chromic acid.

Potash citrate. *See* Citric acid.

Potash ferrate or ferrite:
- Lowe and Evans, 312.
- Brooman (*Marechal and Tessie du Motay*), 964.

Potash hypochlorides or hypochlorites. *See* Potash chlorides.

Potash hyposulphate, hyposulphite, or sulphite, making or obtaining:
- Laming, 325.

Potash hyposulphate, hyposulphite, or sulghite, making or obtaining—*cont.*
- Hähner, 412.
- Richardson and Prentice, 662.
- Townsend and Walker, 714.
- Townsend and Walker, 721.
- Drevet, 722.
- Dickson, 793.
- Brooman (*Burnet*), 835.
- Price, 924.

Potash manganate or permanganate. *See* Manganates.

Potash nitrate or nitrites, making or obtaining:
- Ramseye, 2.
- Wardour, 2.
- Price, Wardour, Barry, and Nutt, 6.
- Harris, 11.
- Linden, 14.
- Nightingale, 17.
- Price, 18.
- Van Haake, 21.
- De Bruges, 22.
- Mantill, 23.
- Dundonald, 52.
- Dundonald, 78.
- Croll, 139.
- Sautter, 196.
- Hills, 240.
- De Sussex, 249.
- White, 276.
- Rotch, 297.
- Watt, 309.
- Petrie, 328.
- Price, 330.
- Watson and Slater, 339.
- Staite, 362.
- Moinier, 404.
- Newton, 420.
- Wagstaffe and Perkins, 425.
- Dale, 465.
- Lürig, 482.
- Macallum, 505.
- Fraser, 552.
- Drouet and Le Coq, 562.
- Fraser, 573.
- Newton, 574.
- Gilbee, 584.
- Henry, 586.
- Roberts and Dale, 594.
- Thoroulde, 598.
- Newton (*Cooper*), 613.
- Newton (*Lefebvre*), 622.
- Richardson, 648.
- Henderson, 668.
- Webster, 709.
- Webster, 732.
- Hughes and Richardson, 761.
- Henry (*Vasseur* and *Lamotte*), 781.

Potash nitrate or nitrites, making or obtaining—*cont.*
Johnson (*Burton*), 783.
Webster, 810.
Clark, 823.
Stille, 844.
Townsend, 861.
Bernhard (*Lagrange*), 943.
Delafield, 969.
Newton (*Baker, Poole, and Stace*), 998.

Potash oxalates. *See* Oxalates.

Potash phosphates, making or obtaining:
Richardson, 361.
Richardson, 373.
Margueritte, 435.
Newton, 514.
Henderson, 546.
Emerson, 606.
De Meloy, 738.
Gerland, 849.
Johnson (*Pollak*), 876.
Brooman (*Aubertin*), 901.
Martin, 977.

Potash plumbates or plumbites. *See* Plumbates.

Potash prussiate. *See* Potassium ferrocyanide.

Potash silicates, making or obtaining:
Blanc and Bazille, 168.
Clough, 182.
Turner, 192.
Ransome, 1022 (*Appendix*).
Hills, 240.
Balmain and Parnell, 275.
Jäger, 332.
Fontainemoreau, 334.
Way and Paine, 348.
Higgin, 372.
Hardinge, 397.
Gossage, 412.
Newton, 420.
Newton, 432.
Bellford (*Kuhlmann*), 441.
Ransome, 445.
Spilsbury, 485.
Newton, 514.
Ellis, 535.
Kenyon, 541.
Newton, 563.
Newton (*Le Chatelier*), 566.
Gossage, 612.
Gossage, 622.
Newton (*Lang*), 660.
Spence (*Vanderburgh*), 679.
Prentiss, 709.
Verwey, 716.

Potash silicates, making or obtaining—*cont.*
Malcolm, 732.
Church, 770.
Gossage, 795.
Ellis, 812.
Thomas, 815.
De Wylde, 856.
Johnson (*Bagnères*), 892.
Ellis, 945.
Penney, 968.
Newton (*Baker, Poole, and Stace*), 998.
Weldon, 1007.

Potash stannates or stannites. *See* Stannates.

Potash sulphate, making or obtaining.
Dundonald, 44.
Dundonald, 52.
Newstead, 62.
Dundonald, 78.
Hunt, 164.
Tilghman, 247.
De Sussex, 252.
Prelier, 254.
Longmaid, 256.
Birkmyre, 258.
Boulton, 317.
Price, 330.
Watson and Slater, 339.
Dering, 364.
Cunninghame, 386.
Condy, 401.
Moinier, 404.
Henderson, 430.
Margueritte, 435.
Frankland, 447.
Johnson (*Persoz*), 450.
Gossage, 526.
Newton, 537.
Gatty, 545.
Deacon, 581.
McCrummen, 585.
Roberts and Dale, 594.
Emerson, 606.
Newton (*Cooper*), 613.
Richardson and Prentice, 662.
Stuart, 692.
Hunter, 702.
Townsend and Walker, 714.
McArdle, 740.
Smith, 742.
Morris, Weare, and Monckton, 753.
Hughes and Richardson, 761.
Balmain, 764.
Paterson, 778.
Abel (*Taillandier*), 780.
Henry (*Vassieur and Lamotte*), 781.

Potash sulphate, making or obtaining—*cont.*
  Johnson (*Burton*), 783.
  De la Peyrouse, 784.
  Dickson, 798.
  Verstraet and Olivier, 802.
  Firmin, 813.
  Clark, 823.
  Readman, 829.
  Spence, 829.
  Clemm, 845.
  Ward, 888.
  Moride, 906.
  Claus, 919.
  Claus, 935.
  McCrummen, 938.
  Davis (*Remond*), 997.
  Newton (*Baker, Poole, and Stace*), 998.

Potash tannates. *See* Tannic acid.

Potash tartrate. *See* Tartaric acid.

Potash tungstates. See Tungstic acid.

Potashes. *See* Potash.

Potassium bromide. *See* Bromine.

Potassium chloride, making or obtaining:
  Dundonald, 44.
  Dundonald, 50.
  Dundonald, 52.
  Newstead, 62.
  Dundonald, 78.
  Tilghman, 247.
  Watt, 309.
  Price, 330.
  Bellford, 336.
  Margueritte, 471.
  Knowles, 538.
  Gilbee, 584.
  McCrummen, 585.
  Emerson, 606.
  McArdle, 740.
  Hughes and Richardson, 761.
  Balmain, 764.
  Henry (*Vasseur and Lamotte*), 781.
  Clark, 823.
  Readman, 829.
  Spence, 829.
  Walsh, 925.
  Claus, 935.
  McCrummen, 938.

Potassium cyanide, making or obtaining:
  Constable, 222.
  Binks, 230.
  Laming, 231.
  Hills, 240.
  Hills, 1022 (*Appendix*).
  Hills, 314.
  Souchon, 337.
  Angier, 342.
  Souchon, 369.
  Meldrum and Young, 466.
  Firmin, 486.
  Binks, 517.
  Binks, 518.
  Knowles, 537.
  Johnson (*Lucas*), 618.
  Clark (*Margueritte and De Sourdeval*), 667.
  Clark (*Margueritte and De Sourdeval*), 670.
  Gélis, 690.
  Chisholm, Chisholm, and Kent, 708.
  Clark (*Margueritte and De Sourdeval*), 726.
  Monckton, 771.
  Hutchinson, 781.
  Clark (*Margueritte*), 841.
  Lorberg, 856.
  Tooth, 893.

Potassium ferricyanides and ferrocyanides, or prussiates of potash, making or obtaining:
  Brown and Hendriks, 106.
  Hendriks, 109.
  Simmons, 113.
  Spence, 121.
  Newmann, 126.
  Swindells, 156.
  Berry, 166.
  Laming, 201.
  Newton, 204.
  Turner, 207.
  Turner, 219.
  Binks, 230.
  Laming, 231.
  Laming and Evans, 286.
  Souchon, 337.
  Watson and Slater, 339.
  Angier, 342.
  Watson, 353.
  Gossage, 374.
  Watson, 387.
  Spence, 403.
  Coste, 412.
  Bramwell, 421.
  Meldrum and Young, 466.
  Johnson, 470.
  Firmin, 486.
  Binks, 517.
  Binks, 518.
  Taylor and Owen, 524.
  Schinz, 561.
  Boulton, 567.

Potassium ferricyanides and ferrocyanides, or prussiates of potash, making or obtaining —*cont.*
- Possoz, 538.
- Crowther, 604.
- Johnson (*Lucas*), 618.
- Newton (*Ferand, Laureau, and Richard*), 642.
- Richardson, 697.
- Clark (*Margueritte and De Sourdeval*), 667.
- Clark (*Margueritte and De Sourdeval*), 670.
- Manning, 673.
- Gélis, 690.
- Webster, 691.
- Clark (*Margueritte and De Sourdeval*), 720.
- Stuart, 756.
- Hutchinson, 804.
- Clark (*Margueritte*), 841.
- Clark (*Dusart and Gélis*), 854.
- Lorberg, 856.
- Tooth, 868.
- Tooth, 893.
- Parkins, 905.
- Brooman (*Paraf-Javel*), 960.
- Paraf (*Paraf-Javal*, 992.

Potassium fluoride. *See* Fluorine.

Potassium iodide. *See* Iodine.

Prussiate of iron. *See* Iron sesqui-ferrocyanide.

Potassium sulphide or sulphuret, making or obtaining:
- Higgins, 29.
- Collison, 31.
- Gerard, 31.
- De Boneuil, 36.
- Dundonald, 44.
- Newstead, 62.
- Clayfield, 66.
- Hodson, 76.
- Dundonald, 73.
- Phillips, 112.
- Croll, 139.
- Fowler, 143.
- Wilson, 146.
- Rowe, 155.
- Poole, 161.
- Hunt, 164.
- De Douhet, 291.
- Spence, 298.
- Boulton, 317.
- Bellford, 336.
- Newton, 343.
- Gossage, 344.

Potassium sulphide or sulphuret, making or obtaining—*cont.*
- Greenshields, 331.
- Werckshagen, 358.
- Robb, 364.
- Robb, 366.
- Elliott and Russel, 368.
- Böringer and Clemm, 378.
- Gossage, 379.
- Gossage, 390.
- Spence, 403.
- Hughes, 448.
- Ellison, 499.
- Gossage, 528.
- Gossage, 591.
- Willans, 626.
- Wilson, 629.
- Arrott, 644.
- Arrott, 681.
- Gossage, 646.
- Willans, 658.
- Nixon, 661.
- Arrott, 681.
- Gélis, 690.
- Hunter, 702.
- Ralston, 711.
- Maillard, 753.
- Hughes and Richardson, 761.
- Cleland, 768.
- Johnson (*Burton*), 783.
- Dickson, 798.
- Dickson, 798.
- Verstraet and Olivier, 802.
- Ward, 810.
- Johnson (*Macfarlane*), 836.
- Brooman (*Burnet*), 843.
- Clemm, 845.
- Bowron and Robinson, 853.
- Johnson (*Baguères*), 892.
- Weldon, 967.
- Stevenson, 1007.
- Stevenson and France, 1010.
- Williamson, 1017.

Prussiates of potash, soda, or iron. *See* Potassium or sodium, ferri or ferrocyanide, or iron sesquiferrocyanide.

Prussic acid. *See* Hydrocyanic acid.

Purple of cassius. *See* Gold oxides.

Pyrogallic acid. *See* Tannic acid.

Pyroligneous acid. *See* Acetic acid.

Quinine and salts. *See* Alkaloids.

Quinine, substitute for:
- Castets, 425.

Raisins, use of:
- Grace, 57.
- Maas, 77.
- Cronier, 160.
- O'Malley, 400.

Rapes, use of:
- Grace, 57.

Retorts, making or constructing.
- Gibbins and Wilkinson, 91.
- Morfitt, 101.
- Simmons, 113.
- Lee, 185.
- Prelier, 254.
- Rochaz, 259.
- Barnes, 264.
- Rochaz, 274.
- White, 276.
- Barlow, 281.
- Protheroe, 290.
- Newton, 295.
- Scott, 296.
- Graham, 318.
- Pattinson, 319.
- Swindells and Nicholson, 334.
- Cowen and Richardson, 344.
- Floret, 348.
- Muclow, 352.
- Smith, 353.
- Cowper, 361.
- Eliot and Russell, 368.
- Zenner, 368
- Souchon, 369.
- Geyelin, 370.
- Trueman, 410.
- Price, 431.
- Johnson (*Persoz*), 450.
- Ellis, 455.
- Barrow, 477.
- Titterton, 485.
- Titterton, 487.
- Titterton, 506.
- Dauglish, 603.
- Johnson (*Lucas*), 618.
- Duncan, Scott, and Dawson, 656.
- Hunt, 669.
- Bower, 677.
- Wheeler, 695.
- Jones, 725.
- McClintock, 758.
- Warlich, 767.
- Cleland, 768.
- Joseph, 772.
- Baggs and Simpson, 785.
- Hutchinson, 804.

Retorts, making or constructing—*cont.*
- Coffey and Redwood, 805.
- Ward, 810.
- Webster, 810.
- Fox, 822.
- Humby, 830.
- Felsch, 830.
- Bousfield (*Elmer*), 832.
- Polkinghorne, 833.
- Lorberg, 852.
- Henry (*Palla*), 861.
- Holdrege (*Gwynne*), 864.
- Bowron and Robinson, 865.
- Lee, 875.
- Cotelle, 877.
- Moutié, 897.
- Chaudet, 939.
- Bell, T. and T. L. G., 947.
- Bankart, 953.
- Mallet, 956.
- De Sinçay, 956.
- Henry (*Laurent*), 963.
- Clark (*Cotelle*), 1000.
- Davis, 1002.
- Stevenson, 1007.
- Weldon, 1007.
- Stevenson and France, 1010.
- Mallet, 1015.

Salacetocella. *See* Oxalic acid.

Sal ammoniac. *See* Ammonium chloride or muriate.

Salt (common). *See* Sodium chloride.

Salts, drying:
- Stone, 38.
- Gossage, 117.
- Wilson, 169.
- Pattinson, 261.
- Rotch, 286.
- Rotch, 297.
- Elliot and Russell, 368.
- Böringer and Clemm, 370.
- Laming, 427.
- Allen, J. and W., 452.
- Moll, 476.
- Fermin, 486.
- Williamson and Stevenson, 495.
- Macullum, 505.
- Bakewell, 547.
- Thompson, 547.
- Richardson, 554.
- Clark (*Martin*), 595.
- Possoz, 598.
- Clark (*Martin*), 602.
- Nation, 630.
- Bush, 638.
- Green, 645.
- Bush, 661.
- Carr, 647.
- Laurens, 665.

Salts, drying—*cont.*
- Herbert (*Brumleu*), 663.
- Johnson (*Ozouf*), 688.
- Richardson and Prentice, 696.
- Verwey, 716.
- Pask, 743.
- Martin, 750.
- Richardson and Irvine, 750.
- Deacon, 780.
- Warner, 790.
- Newall, 850.
- Townsend, 861.
- Ward, 888.
- Shewer, 999.
- Claudet, 1009.
- Bonneville (*Hebert*), 1016.
- Norrington, 1020.

Salt and salts, solutions of, evaporating vessels, &c. for:
- Copley, Sharpey, and Hobart, 2.
- Marford and Hanworth, 3.
- Hutchinson, 5.
- Peck, 7.
- Schmettan, 7.
- Ward, 7.
- Campbell, 8.
- Wayt, 10.
- Ogle, 11.
- Reid, 12.
- Radley, 13.
- Kay and Stell, 13.
- Lucas, 14.
- Bowman and Catherwood, 17.
- Ard, 18.
- Price, 18.
- Mackay and Greenall, 18.
- Baker, 19.
- Scott and Mackay, 21.
- Bailey, 23.
- Vazie, 33.
- Wood, 34.
- Stone, 38.
- Frearson, 40.
- Shannon, 53.
- Manby, 59.
- Cross and Southworth, 64.
- Marshall and Naylor, 66.
- Tomkinson, 68.
- Steel, 72.
- London, P. and P. jun., 74.
- Johnson, 75.
- Crag, E. and W., 76.
- Spencer, 79.
- Johnson, 83.
- Pugh, 83.
- Wilson, 85.
- Gibbins and Wilkinson, 91.
- Smith, 91.
- Parkes, 92.
- Jump and Court, 93.
- Johnson, 93.
- Furnival, 95.
- Young, 95.

Salt and salts, solutions of, evaporating vessels, &c. for—*cont.*
- Gamble, 96.
- Johnson, 98.
- Tilt, 100.
- Braithwaite and Ericsson, 103.
- Church, 103.
- Furnival, 105.
- Jump, 106.
- Newton, 108.
- Garrod, 111.
- Gossage, 117.
- Berry, 118.
- Hall, 122.
- Goodlet, 127.
- Flude, 136.
- Wilson, 137.
- Hall, 141.
- Law, 154.
- Reynolds, 158.
- Firmstone, 163.
- Smith, 180.
- Garnet and Williams, 188.
- Waterton, 191.
- Gibson, 198.
- Sylvester, 205.
- Noah, W. and J., 208.
- Greenshields, 210.
- Gamble, 214.
- Ellins, 217.
- Lidbetter and Loughton, 219
- Britten, 235.
- Ellins, 244.
- Jay, 254.
- Ellins, 262.
- Pickering, 276.
- Masters, 278.
- Murdoch, 279.
- Leake, 309.
- Petrie, 328.
- Brackenbury, 341.
- Augier, 342.
- Elliot and Russell, 349.
- Nesmond, 352.
- Watson, 353.
- Cartwright, 356.
- Vion, 357.
- Brackenbury, 371.
- Gossage, 374.
- Gossage, 379.
- De Bergevin (*Baran*), 386.
- Cunninghame, 386.
- Watson, 387.
- Gossage, 390.
- Gillow, 396.
- Hardinge, 397.
- Collins, 398.
- Gibbs (*Gambond*), 415.
- Collier, 415.
- Gardner, 459.
- Siemans, 470.
- Margueritte, 471.
- Pontifex, 480.
- Ward, 483.

Salt and salts, solutions of, evaporating vessels, &c. for —*cont.*
  Firmin, 486.
  Williamson and Stevenson, 495.
  Jump, 497.
  Roberts, Dale, and Pritchard, 510.
  Partz, 525.
  Lauder and Ireland, 529.
  Collins, 533.
  Imhof, 547.
  Bell, 551.
  Deacon, 555.
  Schinz, 561.
  Newton, 574.
  McCrummen, 585.
  Spence, 587.
  Normandy, 594.
  Wagner, 609.
  Dale, 609.
  Thompson, J. and J., jun., 628.
  Thompson, J. and J., jun., 641.
  Green, 645.
  Corbett, 670.
  Greenway, 675.
  Spence (*Vanderburgh*), 678.
  Moule, 680.
  Fletcher, 682.
  Green, 698.
  Brooman (*Dureau*), 703.
  Westhead, 711.
  Rolston, 711.
  Duméry, 712.
  Roman, 739.
  Martin, 750.
  Maillard, 753.
  Stubbs, 763.
  Gossage, 775.
  Chenaillier, 782.
  Palser, 814.
  Thomas, 815.
  Peek, 816.
  Grantham, 851.
  Mond, 853.
  Brooman (*Lequin*), 862.
  Solvay, 866.
  Tooth, 868.
  Newton (*Wiart*), 882.
  Ward, 888.
  Tooth, 893.
  Hall and Roosen, 898.
  Scott and Tudor, 903.
  Johnson, 904.
  Nicholson, 923.
  Stevenson, 924.
  Walsh, 925.
  Bennett, 930.
  Deltour, 935.
  Gillard, 940.
  Nicholson, 946.
  Wright, 954.
  Hall, 959.

Salt and salts, solutions of, evaporating vessels, &c. for —*cont.*
  Severn, 974.
  Swan, 980.
  Oldham, Penn, and Eades, 981.
  Whelpley and Storer, 990.
  Swan, 1006.
  Stevenson, 1007.
  Claudet, 1009.
  Bonneville (*Hebert*), 1016.
  Williamson, 1017.

Saltpetre. *See* Potash nitrate.

Salt, preserving. *See* Sodium chloride, preserving.

Sea salt. *See* Sodium chloride.

Seaweed, obtaining products from :
  Delaval, 29.
  Hoakesley, 43.
  Hodson, 48.
  Hodson, 60.
  Newstead, 62.
  Phelps, 67.
  Hodson, 70.
  Hodson, 76.
  Attwood, 93.
  Stanford, 738.
  McArdle, 740.
  Walker, 806.
  Moride, 906.
  Leisler, 910.
  Young and Glasford, 926.
  McCrummen, 938.
  Clark (*Gégnon and Gagnage*), 965.
  Paraf, 1003.
  Wanklyn, 1003.

Scheele's green. *See* Arseniates.

Seidlitz powder, granulating :
  Bush, 639.
  Bush, 661.

Selinious acid and compounds :
  Clark (*Verstraet and Schmid*), 831.

Silica. *See* Silicic acid.

Silicic acid, making or obtaining :
  Blanc and Bazille, 168.
  Turner, 193.
  Barlow and Gore, 304.
  Steizewald, 367.
  Hardinge, 397.

Silicic acid, making or obtaining—*cont.*
Pochin, 479.
Newton, 588.
Le Chatelier, 588.
Clark (*Martin*), 593.
Clark (*Martin*), 597.
Clark (*Martin*), 602.
Mennons (*De Siebenthal*), 613.
Wrightson, 649.
Newton (*Lang*), 560.
Cobley, 745.
Church, 770.
Gossage, 795.
De Wylde, 856.
Penney, 968.

Silicium fluoride. *See* Fluorine.

Silver acetate:
Tolhausen (*Rousse*), 751.

Silver chloride:
Gossage, 293.
Swindells, 299.
Longmaid, 306.
Lyte, 383.
Syers, 565.
Gossage, 610.
Henderson, 614.
Henderson, 651.
Longmaid, 671.
Henderson and Down, 700.
Mease, 719.
Tolhausen (*Rousse*), 751.
Gerland, 788.

Silver chromate. *See* Chromic acid.

Silver iodides. *See* Iodine.

Silver from lead:
Birnie, 35.
Chisholm and Bellemois, 147.
Millan del Real, 882.
Phillips, 918.
Brooman (*Cordurié*), 1019.

Silver nitrate:
Petrie, 328.
Syers, 565.
Macaire, 689.
Tolhausen (*Rousse*), 751.

Silver oxides:
Gossage, 293.
Longmaid, 306.
Henderson, 614.

Silver oxides—*cont.*
Henderson, 651.
Cobley, 745.

Simarubine salt:
Richardson, 498.

Silver sulphate, making or obtaining:
Birkmyre, 258.
Gossage, 293.
Longmaid, 306.
Holland, 452.
Syers, 565.
Henderson, 614.
Henderson, 651.
Price, 571.
Mease, 719.
Tolhausen (*Rousse*), 751.

Silver sulphide or sulphuret:
Cookson, 167.
Longmaid, 306.
Longmaid, W. and J., 372.
Radley, 493.
Henderson, 651.

Silver tartrate. *See* Tartaric acid.

Soap, making:
Harewell, Ralegh,
Williams and Clarke, 1.
Jones and Palmer, 1.
Francke, 3.
Heys, 22.
King, 27.
Mitchell, 27.
Heys, 32.
Dundonald, 44.
Crooks, 50.
Crooks, 55.
Howard, 57.
Hodson, 60.
Newstead, 62.
Hodson, 76.
De Berenger, 78.
Dundonald, 78.
Wilson, 85.
Church, 103.
Goodlet, 127.
Watt and Tebbutt, 135.
De Douhet, 291.
Nation and Dyer, 356.
Tournier and De Meckenheim, 381.
Moinier, 404.
Simpson, 408.
Gossage, 412.
Stott, 465.
Lürig, 482.
Deacon, 555.
Henderson, 668.
Prentiss, 709.
Westhead, 711.

Soap, making—*cont.*
Henry (*Vasseur and Janssens*), 801.
Parker and Tanner, 913.

Soda (hydrate or caustic), making or obtaining :
Heys, 22.
Mantell, 23 ?
Turner, 28.
Higgins, 29.
Fordyce, 30.
Collison, 31.
Gerard, 31.
Heys, 32.
Birnie, 35.
De Boneuil, 36.
Glenny, 38.
Dundonald, 44.
Hoakesly, 48.
Hodson, 48.
Dundonald, 50.
Shannon, 53.
Howard, 57.
Hodson, 60.
Newstead, 62.
Clayfield, 66.
Wyatt, 68.
Hodson, 76.
De Beringer, 78.
Dundonald, 78.
Warburton, 86.
Fuller, 89.
Attwood, 109.
Swindells, 125.
Gossage, 125.
Sheridan, 126.
Sheridan, 131.
Losh, 133.
Watt and Tebbutt, 135.
Wilson, 146.
Hunt, 156.
Poole, 161.
Hunt, 164.
Hills, F. and G., 183.
Turner, 193.
Brown, 217.
Turner, 219.
Du Buisson, 223.
Simpson, 236.
Hunt, 236.
De Sussex, 238.
Longmaid, 246.
Tilghman, 248.
Dunlop, 251.
Mitchell and Woolryche, 261.
Pattinson, 261.
Elliot, 302.
Clift, 303.
Taylor, 303.
Cooke, 305.
Watt, 309.
Lowe and Evans, 312.
Claussen, 316.
Cobley, 745.

Soda (hydrate or caustic), making or obtaining—*cont.*
Boulton, 317.
Chisholm, 337.
Nation and Dyer, 363.
Bursill, 359.
Stanley, 367.
Gossage, 374.
McDougall, 377.
Tournier and De Meckenheim, 331.
Cormack, 381.
Ransome, 382.
Cowper (*Laureau*), 407.
Simpson, 408.
Margueritte, 435.
Margueritte, 437.
Napier, 444.
Clapham, 447.
Allen, J. and W., 452.
Tilghman, 458.
Stott, 465.
Barrow, 473.
Stevenson and Williamson, 474.
Barrow, 477.
Lürig, 482.
Balmain and Colby, 483.
Spilsbury, 492.
Newton, 514.
Gossage, 526.
Gossage, 546.
Bakewell (*Thompson*), 547.
Deacon, 553.
Deacon, 558.
Newton (*Le Chatelier*), 566.
Deacon, 568.
Greenshields, 572.
Newton, 574.
Henry, 586
Newton (*Le Chatelier*), 588.
Gossage, 591.
Thomas, C. J., T. H., and C., 596.
Possoz, 608.
Dale, 609.
Seymour (*Leplay*), 611.
Gossage, 623.
Willans, 626.
Arrott, 629.
Greenshields, 631.
Bakewell (*Pemberton*), 634.
Richardson, 648.
Willans, 658.
Deacon and Robinson, 659.
Henderson, 668.
Standley, 694.
Hunter, 702.
Rolston, 711.
Malcolm, 732.
Webster, 732.
Meley, 735.
Cobley, 745.
Gillard, 746.
Oliver, Grantham, Sinnock, and Leverson, 754.
Webster, 758.

Soda (hydrate or caustic), making or obtaining—*cont.*
Brooman (*Aubertin*), 769.
Gossage, 775.
Henry (*Vassaur and Lamotte*), 781.
Johnson (*Burton*), 782.
Gregg and Simpson, 785.
Dickson, 793.
Gossage, 795.
Brooman (*Leplay and Cuisinier*), 796.
Dickson, 798.
Webster, 810.
Mond, 811.
Palmer, 814.
Swinburne, 821.
Powers and Dale, 825.
Brooman (*Thibierge*), 829.
Brooman (*Burnet*), 835.
Richardson and Irvine, 848.
Clemm, 846.
Bowron and Robinson, 859.
Bowron and Robinson, 866.
Thornthwaite, 867.
Chadwick and Clench, 868.
Blanks, 870.
Doughty, 879.
Brooman (*Aubertin*), 901.
Johnson, 904.
Murdoch, 906.
Newton (*Bang*), 909.
Hunter, 909.
Parker and Tanner, 913.
Routledge, 916.
Routledge and Richardson, 921.
[illegible], 929.
Nicholson, 931.
Sutton, [illegible]
Walsh, [illegible]
Hunter, [illegible]
Routledge and Richardson, [illegible]
[illegible]
[illegible]
Nicholson, [illegible]
[illegible]
Brooman (*[illegible]*), [illegible].
Wright, [illegible]
Clark (*Gignoux and [illegible]*), [illegible]
Robinson, [illegible]
Henry (*[illegible]*), [illegible]
Weldon, 971.
Weldon, [illegible]
Routledge, Richardson, and Richardson, [illegible]
[illegible] (*[illegible]*), [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

Soda (hydrate or caustic), making or obtaining—*cont.*
Weldon, 997.
Price (*[illegible]*), 1001.

Soda acetate, making :
Warburton, 62.
Condy, 342.
Condy, 414.
Spilsbury, 580.
Newton (*Le Chatelier*), 583.
Pomeroy, 598.
Buchholz, 696.
Cobley, 718.
Lorberg, 729.
Stanford, 738.
Dickson, 793.

Soda aluminate. *See* Aluminates.

Soda arseniates or arsenites. *See* Arseniates.

Soda bi-carbonate, making or obtaining :
Watt and Tebbutt, 135.
Bower, 169.
Waterton, 178.
Turner, 193.
Newton, 348.
Robb, 366.
Gossage, 374.
Gossage, 406.
Elliot, 415.
Schloesing, 422.
Johnson, 423.
Bellford, 448.
Gossage, 461.
Marguerite, 471.
Barrow, 477.
Bell, 551.
Rolland, 569.
Schloesing, 569.
Gossage, [illegible]
Wilson, [illegible]
Gossage, [illegible]
Verstraet and Olivier, [illegible]
Clemm, 845.
[illegible], 891.
Hunter, [illegible]
Hunter, [illegible]
[illegible], [illegible]
Weldon, 971.
[illegible], 981.
Newton (*[illegible], [illegible], and [illegible]*), [illegible]

Soda bi-sulphite :
Dickson, [illegible]

Soda borates. *See* Boracic acid.

Soda carbide. *See* Soda carbonate.

Soda carbonate, making or obtaining:
- Jones and Palmer, 1.
- Hughes, 4.
- King, 27.
- Higgins, 29.
- Fordyce, 30.
- Collison, 31.
- Gerard, 31.
- Heys, 32.
- De Boneuil, 36.
- Hodson, 42.
- Dundonald, 44.
- Hately, 46.
- Hodson, 48.
- Dundonald, 53.
- Howard, 57.
- Hodson, 60.
- Newstead, 62.
- Clayfield, 66.
- Phelps, 67.
- Wyatt, 68.
- Hodson, 76.
- De Berenger, 78.
- Dundonald, 78.
- Fuller, 89.
- Attwood, 90.
- McLeod, 102.
- Attwood, 109.
- Leighton, 116.
- Hemming, 123.
- Spilsbury and Maugham, 127.
- Watt and Tebbutt, 135.
- Dyar and Hemming, 138.
- Heard, 140.
- Fowler, 143.
- Samuel, 145.
- Wilson, 146.
- Poole, 161.
- Hunt, 164.
- Blanc and Bazille, 168.
- Bower, 169.
- Wilson, 169.
- Blair and Watson, 170.
- Clough, 182.
- Hills, F. and G., 183.
- Shanks, 183.
- Turner, 193.
- Kneller, 196.
- Denoon, 205.
- Brown, 217.
- Turner, 219.
- Smith, 229.
- Ward, 238.
- Hills, 240.
- Longmaid, 240.
- Longmaid, 256.
- Balmain and Parnell, 275.
- De Douhet, 291.
- Gatty, 293.
- Rotch, 297.
- Spence, 298.
- Elliot, 302.
- Taylor, 303.
- Barlow and Gore, 304.
- Cooke, 305.

Soda carbonate, making or obtaining—*cont*.
- Longmaid, 306.
- Watt, 309.
- Richardson, 313.
- Claussen, 316.
- Boulton, 317.
- Bellford, 336
- Chisholm, 337.
- Newton, 343.
- Aspden, 351.
- Greenshields, 351.
- Cottrill, 355.
- Werckshagen, 358.
- Buraill, 359.
- Robb, 364.
- Robb, 366.
- Stanley, 367.
- Böhringer and Clemm, 370.
- Longmaid, W. and J., 372.
- Gossage, 374.
- Gossage, 379.
- Tournier and De Meckenheim, 381.
- Cormack, 381.
- Gwynne, J. and J. E. A., 395.
- Elliot, 415.
- Gibbs, 415.
- Bramwell, 421.
- Schloesing, 422.
- Johnson, 423.
- Laming, 427.
- Blythe and Kopp, 429.
- Margueritte, 435.
- Margueritte, 437.
- Blythe and Kopp, 442.
- Bellford, 443.
- Napier, 444.
- Clapham, 447.
- Hughes, 448.
- Allen, J. and W., 452.
- Stott, 465.
- Margueritte, 471.
- Stott, 472.
- Barrow, 473.
- Stevenson and Williamson, 474.
- Barrow, 477.
- Lürig, 482.
- Balmain and Colby, 483.
- Spilsbury, 492.
- Newton, 514.
- Brooman (*Meedach*), 528.
- Bell, 551.
- Ward, 559.
- Wynants, 559.
- Newton (*Le Chatelier*), 566.
- Schloesing and Rolland, 569.
- Greenshields, 569.
- Greenshields, 572.
- McCrummen, 585.
- Newton (*Le Chatelier*), 588.
- Possoz, 598.
- Emerson, 606.
- Dale, 609.
- Gossage, 612.

Soda carbonate, making or obtaining—*cont.*
- Nowton (*Cooper*), 613.
- Newton (*Le Chatelier*), 619.
- Gossage, 622.
- Gossage, 623.
- Wilson, 629.
- Greenshields, 631.
- Bush, 638.
- Spencer, 642.
- Arrott, 644.
- Laming, 645.
- Gossage, 646.
- Richardson, 648.
- Deacon and Robinson, 659.
- Bush, 661.
- Henderson, 668.
- Hunt, 669.
- Arrott, 681.
- Hunter, 702.
- Hunt, 706.
- Newton (*Le Chatelier*), 708.
- Ralston, 711.
- De Meley, 735.
- Clark (*Margueritte and De Sourdeval*), 735.
- Laming (*Laming*), 738.
- Cobley, 745.
- Gillard, 746.
- Oliver, Grantham, Sinnock, and Leverson, 754.
- McClintock, 758.
- Brooman (*Aubertin*), 760.
- Cleland, 768.
- Clark (*Margueritte and De Sourdeval*), 779.
- Deacon, 780.
- Johnson (*Burton*), 783.
- Dickson, 793.
- Gossage, 796.
- Dickson, 798.
- Verstraet and Olivier, 802.
- Walker, 806.
- Palser, 814.
- Swinburne, 821.
- Powers and Dale, 823.
- Johnson (*Macfarlane*), 826.
- Brooman (*Burnet*), 835.
- Clemm, 846.
- Clark (*Gélis and Dusart*), 854.
- De Wyldé, 856.
- Lorberg, 856.
- Townsend, 861.
- Bowron and Robinson, 865.
- Solvay, 866.
- Chadwick and Clench, 868.
- Ward, 888.
- Ozouf, 891.
- Johnson (*Bagnères*), 892.
- Brooman (*Aubertin*), 901.
- Moride, 906.
- Newton (*Bang*), 909.
- Hunter, 909.
- Routledge, 916.
- Claus, 919.
- Routledge and Richardson, 921.
- Bowditch, 922.
- Potter, 925.
- Walsh, 925.
- Hunter, 927.
- Routledge and Richardson, 933.
- Claus, 935.
- Gillard, 940.
- Spence, 948.
- Baker (*Collyer*), 953.
- Weldon, 971.
- Routledge, Richardson, and Richardson, 975.
- Amos and Anderson, 976.
- Weatherdon (*Oaminade*), 978.
- Luuge, 981.
- Weldon, 987.
- Newton (*Baker, Poole, and Stäce*), 998.
- Weldon, 1007.
- Price (*Blägel*), 1011.
- Williamson, 1017.

Soda chromate. *See* Chromates.

Soda chlorate, chlorite, hypochlorate, or hypochlorite. *See* Soda chloride.

Soda chloride:
- Watt and Tebbutt, 134.
- Watt and Tebbutt, 135.
- Binks, 149.
- Watt, 309.
- Drouet and Le Coq, 562.
- Routledge and Richardson, 853.

Soda ferrate or ferrite:
- Lowe and Evans, 312.
- Brooman (*Maréchal and Tessie du Motay*), 984.

Soda fluosilicates. *See* Fluorine.

Soda hyposulphate, hyposulphite, and sulphite, making or obtaining:
- Donkin, 242.
- Losh, 324.
- Laming, 325.
- Price, 330.
- Johnson, 336.
- Gossage, 374.
- Hähner, 411.
- Condy, 414.
- Brooman (*Mesdach*), 528.

Soda hyposulphate, hyposulphite, and sulphite, making or obtaining—*cont.*
- Nixon, 661.
- Richardson and Prentice, 662.
- Gélis, 690.
- Townsend and Walker, 714.
- Townsend and Walker, 721.
- Drevet, 722.
- Jullion, 724.
- Noble, 743.
- Dickson, 793.
- Dickson, 798.
- Walker, 806.
- Brooman (*Burnet*), 835.
- Clapham, 844.
- Price, 924.
- Robinson, 956.

Soda citrates. *See* Citric acid.

Soda manganate or permanganate. *See* Manganates.

Soda nitrates and nitrites, making or obtaining:
- Croll, 139.
- Heard, 140.
- Sauter, 196.
- De Sussex, 249.
- White, 276.
- Watt, 309.
- Petrie, 328.
- Price, 330.
- Stalte, 362.
- Moinier, 404.
- Gibbs (*Gamboni*), 415.
- Newton, 420.
- Wagstaffe and Perkins, 425.
- Dale, 465.
- Lürig, 482.
- Drouet and Le Coq, 562.
- Roberts and Dale, 594.
- Newton (*Lefebvre*), 622.
- Richardson, 648.
- Henderson, 668.
- Webster, 709.
- Webster, 732.
- Webster, 758.
- Henry (*Vasseur and Lamotte*), 781.
- Johnson (*Burton*), 783.
- Webster, 810.
- Clark, 823.
- Bernhard (*Lagrange*), 943.
- Delafield, 969.
- Newton (*Baker, Poole, and Stace*), 998.

Soda oxalates. *See* Oxalates.

Soda phosphates:
- Dundonald, 52.
- Mercer, 236.

Soda phosphates—*cont.*
- Mercer and Blythe, 280.
- Bellford, 336.
- Richardson, 361.
- Richardson, 373.
- Margueritte, 435.
- Maugham, 488.
- Henderson, 548.
- Emerson, 606.
- De Meley, 735.
- Brooman (*Aubertin*), 760.
- Gerland, 849.
- Johnson (*Pollak*), 876.
- Brooman (*Aubertin*), 901.
- Martin, 977.

Soda phospo-stannates. *See* Stannates.

Soda plumbate or plumbite. *See* Plumbates.

Soda prussiate. *See* Sodium ferro and ferricyanide.

Soda sebate:
- Dundonald, 52.

Soda sesqui-carbonate. *See* Soda bi-carbonate.

Soda silicates. *See* Potash silicates.

Soda stannate or stannite. *See* Stannates.

Soda sulphate, making or obtaining:
- Fordyce, 24.
- Higgins, 29.
- Collison, 31.
- Gerard, 31.
- Menish, 41.
- Dundonald, 42.
- Dundonald, 44.
- Newstead, 62.
- Wyatt, 68.
- Wright, 101.
- Philips, 112.
- Maugham, 114.
- Clay, 123.
- Lutwyche, 123.
- Spilsbury and Maugham, 127.
- Bell, 130.
- Wilson, 146.
- Barratt, 149.
- Binks, 149.
- Ford, 153.
- Gamble, 154.
- Duclos de Boussois, 157
- Hunt, 164.
- Croll, 172.

Soda sulphate, making or obtaining—*cont.*
- Hompesch, 185.
- Seybel, 192.
- Longmaid, 194.
- Longmaid, 206.
- Turner, 210.
- Birkmyre, 212.
- Barratt, 215.
- Brown, 217.
- Simpson, 220.
- Bell, 231.
- Tilghman, 248.
- Dunlop, 251.
- De Sussex, 252.
- Prelier, 254.
- Longmaid, 256.
- Laming, 256.
- Birkmyre, 259.
- Rowlandson, 273.
- Balmain and Parnell, 275.
- Richardson, 283.
- Cormack, 284.
- Laming and Evans, 286.
- Fontainemoreau, 292.
- Gossage, 293.
- Swindells, 299.
- Longmaid, 300.
- Boulton, 317.
- Bellford, 336.
- Robb, 364.
- Dering, 364.
- Robb, 366.
- Gossage, 374.
- Gossage, 379.
- Shanks, 380.
- Cunninghame, 386.
- Gossage, 390.
- Condy, 401.
- Spence, 403.
- Moinier, 404.
- Hähner, 411.
- Condy, 414.
- Schwabe, 429.
- Henderson, 430.
- Armbruster and Laist, 445.
- Clapham, 447.
- Frankland, 447.
- Hughes, 448.
- Johnson (*Persoz*), 450.
- Allen, J. and W., 452.
- Favre, 454.
- Atkinson, 455.
- Barrow, 477.
- Ellis, 490.
- Gossage, 526.
- Brooman (*Moodsch*), 528.
- Siemens, 533.
- Newton, 537.
- Gatty, 543.
- Greenshields, 569.
- Greenshields, 572.
- Deacon, 581.
- Roberts and Dale, 594.
- Theroulde, 598.
- Laming, 600.
- Emerson, 604.
- Newton (*Cooper*), 612.
- Newton (*Le Chatelier*),
- Arrott, 629.
- Bush, 638.
- Gossage, 646.
- Bush, 661.
- Richardson and Prent
  662.
- Richardson, 664.
- Longmaid, 671.
- West, 689.
- Davies (*Carré*), 690.
- Henderson and Down, 7
- Hunter, 702.
- Newton (*Le Chatelier*),
- Ralston, 711.
- Townsend and Walker,
- Laing and Swindells, 73
- De Meloy, 735.
- McArdle, 740.
- Smith, 742.
- Morris, Weare, and Mu
  ton, 753
- McClintock, 758.
- Hughes and Richard
  761.
- Cleland, 768.
- Roberts and Dale, 769.
- Paterson, 778.
- Abel (*Taillandier*), 780.
- Henry (*Vasseur*), 781.
- Lamotte, 781.
- Johnson (*Burton*), 783.
- De la Peyrouse, 784.
- Dickson, 798.
- Verstraet and Olivier, 8
- Walker, 806.
- Richardson, 817.
- Sonstadt, 819.
- Clark, 823.
- Johnson (*Macfarlane*).
- Brooman (*Thibierge*). 8
- Readman, 839.
- Richardson and Steven
  840.
- Clemm, 845.
- Townsend, 861.
- Baggs and Simpson, 902.
- Scott and Tudor, 903.
- Johnson, 904.
- Moride, 906.
- Claus, 919.
- Claus, 935.
- McCrummen, 938.
- Spence, 948.
- Weldon, 971.
- Ames and Anderson, 97
- Davies (*Rémond*), 987.
- Newton (*Baber, Poole,*
  Stace), 993.
- Claudet, 1009.
- Crockford, 1013.

Soda sulphite. See Soda hy
sulphate.

Soda tannate. *See* Tannic acid.

Soda tartrates. *See* Tartaric acid.

Soda titanate:
- Newton (*Le Chatelier*), 706.

Soda tungstate. *See* Tungstic acid.

Soda urate:
- Turner, 234.

Sodium bromides. *See* Bromine.

Sodium chloride, making or obtaining:
- Rudston and Croote, 2.
- Copley, Sharpey, and Hobart, 2.
- Murford and Hanworth, 3.
- Wandebrooke, Culpepper, and Scandalarus, 3.
- Francke, 3.
- Hutchinson, 5.
- Mayo (*Du Fresne*), 5.
- Marbury (*Dason*), 6.
- Bennett, 7.
- Perk, 7.
- Schmettan, 7.
- Ward, 7.
- Campbell, 8.
- Desaguliers, Niblet, and Vreem, 8.
- Wayt, 10.
- Ogle, 11.
- Reid, 12.
- Radley, 13.
- Kay and Stell, 13.
- Lucas, 14.
- Bowman and Catherwood, 17.
- Ard, 18.
- Price, 18.
- Mackay and Greenall, 18.
- Baker, 19.
- Scott and Mackay, 20.
- Mantell, 23.
- Bailey, 23.
- Vazie, 33.
- Wood, 34.
- Binnie, 35.
- Frearson, 40.
- Shannon, 53.
- Manley, 59.
- Newstead, 62.
- Cross and Southworth, 64.
- Marshall and Naylor, 65.
- Tomlinson, 68.
- Steel, 72.
- London, P., and P., jun., 74.
- Johnson, 75.

Sodium chloride, making or obtaining—*cont.*
- Cragg, E. and W., 76.
- Strachan, 77.
- Spencer, 79.
- Johnson, 83.
- Pugh, 88.
- Smith, 91.
- Parkes, 92.
- Johnson, 93.
- Jump and Court, 93.
- Furnival, 95.
- Young, 95.
- Furnival and Craig, 96.
- Johnson, 98.
- Tilt, 100.
- Braithwaite and Ericsson, 103.
- Church, 103.
- Furnival, 105.
- Jump, 106.
- Newton, 108.
- Garrod, 111.
- Hall, 122.
- Goodlet, 127.
- Flude, 136.
- Wilson, 137.
- Hall, 141.
- Law, 154.
- Reynolds, 156.
- Firmstone, 163.
- Waterton, 176.
- Furnival, 179.
- Smith, 180.
- Pattinson, 186.
- Furnival, 187.
- Garnet and Williams, 188.
- Waterton, 191.
- Longmaid, 194.
- Kneller, 196.
- Gibson, 198.
- Sylvester, 205.
- Longmaid, 206.
- Noah, W. and J., 208.
- Greenshields, 210.
- Ellins, 217.
- Lidbetter and Loughton, 219.
- Britten, 235.
- Ellins, 244.
- Arrott, 260.
- Ellins, 262.
- Pickering, 276.
- Murdoch, 279.
- Rotch, 296.
- Leake, 309.
- Lowe and Evans, 312.
- Bellford, 326.
- Brockenbury, 341.
- Elliot and Russell, 349.
- Brackenbury, 371.
- Higgin, 372.
- Gillow, 396.
- Falk, 402.
- Gardner, 459.
- Siemens, 470.
- Margueritte, 471.

Sodium chloride, making or obtaining—*cont.*
- Jump, 497.
- Margueritte, 511.
- Partz, 525.
- Lauder and Ireland, 529.
- Collins, 533.
- Knowles, 537.
- Imhof, 527.
- McCrummen, 585.
- Theroulde, 598.
- Emerson, 606.
- Wagner, 609.
- Newton (*Le Chatelier*), 619.
- Thompson, J. and J., jun., 628.
- Thompson, J. and J., jun., 641.
- Green, 645.
- Corbett, 670.
- Greenway, 675.
- Green, 698.
- Davies (*Carré*), 699.
- Newton (*Le Chatelier*), 706.
- Ralston, 711.
- Duméry, 712.
- McArdle, 740.
- Hughes and Richardson, 761.
- Stubbs, 763.
- Henry (*Vasseur and Lamotte*), 781.
- Walker, 800.
- Clark, 823.
- Brooman (*Thibierge*), 828.
- Readman, 829.
- Stille, 844.
- Clemm, 845.
- Grantham, 839.
- Townsend, 861.
- Brooman (*Lequin*), 862.
- Whitelaw, 871.
- Hall and Roosen, 893.
- Walsh, 925.
- McCrummen, 938.
- Jee, 941.
- Bernhard (*Lagrange*), 943.
- Hall, 959.
- Lycett, 969.

Sodium chloride, colouring:
- Jee, 941.

Sodium chloride, preserving:
- Davidson, 171.

Sodium chloride, precipitating acids and earth salts from:
- Manby, 59.
- London, P., and P., jun., 74.
- Margueritte, 511.
- Sonstadt, 819.

Sodium chloride, volatilizing:
- Margueritte, 511.
- Gossage, 795.

Sodium cyanide. *See* Potassium cyanide.

Sodium ferri or ferro-cyanide or prussiate of soda. *See* Potassium ferri or ferro cyanides.

Sodium fluoride. *See* Fluorine.

Sodium iodides. *See* Iodine.

Sodium sulphide or sulphuret. *See* Potassium sulphide or sulphuret.

Spirit of salt. *See* Hydrochloric acid.

Stannates or stannites, making or obtaining:
- Greenwood, Mercer, and Barnes, 225.
- Young, 270.
- Rowlandson, 273.
- Mercer and Blythe, 280.
- Richardson, 319.
- Haeffely, 409.
- Higgin, 413.
- Dale, 465.
- Spilsbury, 485.
- Roberts and Dale, 594.
- Powers and Dale, 825.

Steam, use of, in making salts, &c.:
- Desaguliers, Niblet, and Vreem, 8.
- Scott and Mackay, 20.
- Vazie, 33.
- Wood, 34.
- Steel, 72.
- Johnson, 75.
- Johnson, 83.
- Hills and Haddock, 89.
- Smith, 91.
- Johnson, 93.
- Furnival, 95.
- Young, 95.
- Gamble, 96.
- Groves, 98.
- Johnson, 98.
- Tilt, 100.
- Church, 103.
- Furnival, 105.
- Newton, 108.
- Barsham, 113.
- Simmons, 113.
- Leighton, 116.

Steam, use of, in making salts, &c.—*cont.*

Berry, 118.
Swindells, 125.
Sheridan, 131.
Midgley and Kyan, 132.
Reynolds, 158.
Flude, 159.
Blanc and Bazille, 168.
Neale and Duyck, 179.
Smith, 180.
Lejeune, 187.
Newton, 188.
Rodgers, 197.
Gibson, 198.
Duclos de Boussois, 200.
Swindells, 209.
Greenshields, 210.
Ellins, 217.
Lidbetter and Loughton, 219.
Constable, 222.
Hills, 227.
Binks, 230.
Bell, 231.
Britten, 235.
Bell, 239.
Pattinson, 239.
Hills, 240.
Ellins, 244.
Lothman, 247.
Tilghman, 248.
De Sussex, 249.
Jay, 254.
Birkmyre, 258.
Crane and Jullion, 260.
Ellins, 262.
Solomons and Azulay, 263.
Richardson, 265.
Hills, 268.
Young, 270.
Pickering, 276.
Masters, 278.
Rodgers, 279.
Ecarnot, 282.
Protheroe, 290.
Fontainemoreau, 292.
Spence, 298.
Pattinson, 319.
Bell, 322.
Laming, 325.
Roberts, 330.
Gossage, 344.
Henderson, 354.
Werckshagen, 358.
Robb, 366.
Geyelin, 370.
Barsham, 374.
Cunninghame, 386.
Chisholm, 396.
Gillow, 396.
Hardinge, 397.
Lister, 400.
Condy, 401.
Hahner, 411.
Gossage, 412.
Gibbs (*Gambond*), 415.

Steam, use of, in making salts, &c.—*cont.*

Collier, 415.
Henderson, 430.
Price, 431.
Margueritte, 435.
Laming, 438.
Schmersahl and Bouck, 439.
Pochin, 440.
Frankland, 447.
Holland, 452.
Ellis, 455.
Gardner, 459.
Martien, 460.
Gossage, 461.
Higgin, 463.
Siemens, 470.
Barrow, 477.
Gossage, 484.
Firmin, 486.
Radley, 493.
Williamson and Stevenson, 495.
Jump, 497.
Elliot, 503.
Atkinson, 510.
Walker, 522.
Lander and Ireland, 529.
Proctor, 540.
Henderson, 548.
Gossage, 550.
Jennings, 560.
Hills, 561.
Burton, 563.
Blair, 564.
Newton (*Le Chatelier*), 566.
Barham, 568.
Gossage, 591.
Dauglish, 603.
Crockford, 605.
Emerson, 606.
Dale, 609.
Henderson, 614.
Thompson, J. and J., jun., 628.
Thompson, J. and J., jun., 641.
Manbré, 639.
Blair, 655.
Willans, 658.
Newton (*Lang*), 660.
Clark (*Margueritte and De Sourdeval*), 667.
Hunt, 669.
Greenway, 675.
Spence (*Vanderburgh*), 679.
Henry (*Obert, Vasseur, and Houbigant*), 679.
Fletcher, 682.
Nicholson, 685.
Johnson (*Ozouf*), 688.
Petrie, 692.
Wheeler, 695.
Hunter, 702.
Brooman (*Dureau*), 703.
Chisholm, Chisholm, and Kent, 706.

Steam, use of, in making salts, &c.—*cont.*

Newton (*Le Chatelier*), 706.
Ralston, 711.
Mease, 719.
Drevet, 722.
Laing, 727.
Ward, 733.
Laing and Swindells, 733.
Clark (*Margueritte and De Sourdeval*), 735.
Laming (*Laming*), 738.
Stanford, 738.
Gillard, 746.
Abel (*Rowland*), 757.
McClintock, 758.
Brooman (*Leplay and Cusinier*), 765.
Monckton, 771.
Glass, 777.
Baggs and Simpson, 785.
Croll, 791.
Gossage, 795.
Brooman (*Leplay and Cuisinier*), 796.
Coffey and Redwood, 805.
Hunt, 808.
Glass, 812.
Peck, 816.
Swinburne, 821.
Powers and Dale, 825.
Bousfield (*Elmer*), 832.
Brooman (*Burnet*), 835.
Clemm, 845.
Grantham, 851.
Robinson, 851.
Mond, 853.
Henry (*Pallu*), 861.
Brooman (*Lequin*), 862.
Holdrege (*Gwynne*), 864.
Shanks, 870.
Lee, 875.
Davies (*Smith and Savage*), 876.
Jones, 878.
Doughty, 879.
Newton (*Wiart*), 882.
Jones, 884.
Ward, 888.
Forbes, 894.
Hall and Roosen, 898.
Scott and Tudor, 903.
Johnson, 904.
Newton (*Bang*), 909.
Binks, 910.
Leisler, 910.
Price, 911.
Laurent and Castheläz, 914.
Routledge, 916.
Nicholson, 923.
Clark (*Negret, Orioli, and Fridet*), 926.
Deltour, 934.
Gillard, 940.
Lockey, 942.
Newton (*Emery*), 944.
Castheläz and Basset, 946.
Nicholson, 946.
Schaffner, 948.
Clark (*Negret, Orioli, and Fridet*), 951.
Bankart, 953.
Clark (*Gégnon and Gegnage*), 955.
Baker (*Collyer*), 958.
Henry (*Laurent*), 963.
Delafield, 969.
Weldon, 971.
Weatherdon (*Caminade*), 973.
Oldham, Penn, and Eades, 981.
Lange, 981.
Noone, 985.
Weldon, 987.
Newton (*Baker, Poole, and Stace*), 993.
Rowbotham, 1001.
Hughes (*Large*), 1001.
Swan, 1003.
Weldon, 1007.
Leather, 1012.
De Wissocq and Krasinski, 1016.
Brooman (*Corduriè*), 1019.

Stearic acid:

Moinier, 404.

Strontia (hydrate or caustic), making or obtaining:

Samuel, 145.
Tilghman, 248.
Taylor, 303.
Tilghman, 458.
Henderson, 548.
Church, 770.
Newton (*De Massy, L. P. R. and L. R.*), 878.
Robinson, 1003.

Strontia arseniate. *See* **Arseniates.**

Strontia carbonate:

Taylor, 303.
Brooman (*Delaune*), 776.

Strontia chlorate or chloride, making or obtaining:

Tennant, 51.
Tennant, 54.
De Sussex, 249.
De Sussex, 252.
Watt, 309.
Elliot, 415.
Clark, 507.
Henderson, 548.

Strontia chlorate or chloride, making or obtaining—*cont.*

- Bischof, 773.
- Newton (*De Massy, L. P. R. and L. R.*), 878.

Strontia citrates. *See* Citric acid.

Strontia nitrates and nitrites:

- Crane and Jullion, 260.
- Watt, 309.

Strontia oxalate. *See* Oxalates.

Strontia phosphate:

- Henderson, 548.

Strontia silicate:

- Henderson, 548.
- Cobley, 745.
- Church, 770.

Strontia stannate. *See* Stannates.

Strontia sulphate, making or obtaining:

- Samuel, 145.
- De Douhet, 291.
- Claussen, 316.
- Price, 330.
- Church, 770.
- Bischof, 773.
- Duncan, 774.
- Newton (*De Massy, L. P. R. and L. R.*), 878.

Strontia tartrates. *See* Tartaric acid.

Strontia tungstates. *See* Tungstic acid.

Strontium cyanide:

- Clark (*Marguerittle and De Sourdeval*), 667.
- Clark (*Marguerittle and De Sourdeval*), 670.
- Chisholm, Chisholm, and Kent, 763.
- Clark (*Marguerittle*), 841.

Strontium sulphide or sulphuret, making or obtaining:

- Samuel, 145.
- De Douhet, 291.
- Spence, 296.
- Taylor, 303.
- Brooman (*Delaune*), 776.
- Newton (*De Massy, L. P. R. and L. R.*), 878.
- Robinson, 1008.

Strychnine. *See* Alkaloids.

Sulphate of soda. *See* Soda sulphate.

Sulphide or sulphuret of hydrogen. *See* Hydrogen sulphide.

Sulphocyanogen and sulphocyanides:

- Spence, 858.
- Wrightson, 860.
- Spence, 874.

Sulphur, making or obtaining:

- Hutchins, 10.
- Champion, 10.
- Sanderson, 24.
- Sanderson, 26.
- Dundonald, 44.
- Sheffield, 72.
- Edwards and Williams, 81.
- Leighton 116.
- Dyar and Chisholm, 157.
- Duclos de Boussois, 157.
- Cookson, 167.
- Farmer, 168.
- Harvey, 172.
- Lejeune, 187.
- Duclos de Boussois, 189.
- Kneller, 196.
- Rodgers, 197.
- Duclos de Boussois, 200.
- Newton, 203.
- Lee, 203.
- Gossage, 232.
- Dunlop, 251.
- Laming, 254.
- Croll, 255.
- Laming, 266.
- McDougall and Rawson, 269.
- Hills, 1022 (*Appendix*).
- Laming and Evans, 286.
- Fontainemoreau, 292.
- Taylor, 303.
- Hills, 314.
- Boulton, 317.
- Losh, 331.
- Laming, 335.
- Gossage, 344.
- Aspdin, 351.
- Werckshagen, 358.
- Robb, 363.
- Boringer and Clemm, 370.
- Chisholm, 375.
- Pattinson, 385.
- Cunninghame, 393.
- Cookson, 403.
- Trueman, 410.
- Spence, 423.
- Spence, 424.
- Johnson (*Persoz*), 430.
- Favre, 454.
- Stott, 455.
- Lozano, 463.

Sulphur, making or obtaining—cont.
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
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[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible], 417.
[illegible], 631.
Spender, 642.
Wrightson, 645.
Hunter, 655.
Williams, 658.
Wrightson, 660.
Wrightson, 668.
Hunt, 669.
Wilson, 682.
Townsend and Walker, 687.
Gélis, 690.
Hunter, 702.
Hunt, 705.
Spence, 708.
Losh, 712.
Townsend and Walker, 714.
Hallett and Stenhouse, 720.
Hallett and Stenhouse, 722.
Drevet, 722.
Jullion, 724.
Clark (*Marguerite and De Sourdeval*), 725.
Willson and Patters, 742.
Noble, 743.
Balmain and Kean, 760.
Cleland, 768.
Brooman (*Delanne*), 776.
Livesey, 787.
Dickson, 793.
Schnell (*Mond*), 803.
Coffey and Redwood, 805.
Bath, 810.
Marriott and Holroyd, 830.
Brooman (*Burnet*), 835.
Baggs and Simpson, 838.
Clapham, 839.
Clemm, 843.
Mond, 853.
Jones, 864.
Jones, 878.
Jones, 884.
Napier, [illegible].
[illegible], [illegible].
Gurlt, [illegible].

Sulphur, making or obtain
—cont.
Schaffner, [illegible].
De Sussex, [illegible].
Bell, [illegible].
Pengilly, [illegible].
Hofmann, [illegible].
Bousfield (*Hofmann*),

Sulphur chloride, making:
Henderson, [illegible].
Rainford, [illegible].
Crump, [illegible].

Sulphuretted hydrogen. Se
Hydrogen sulphide.

Sulphuric acid, making o
obtaining:
Whitmore, 4.
Ward and White, 13.
Van Hecke, 22.
Sanderson, 24.
Howard, 57.
Winsor, 65.
Winsor, 70.
Winsor, 71.
Winsor, 72.
Pelletan, 83.
Wilson, 85.
Hills and Haddock, 89.
Phillips, 105.
Maugham, 114.
Spence, 121.
Gossage, 130.
Clark, 132.
Gossage, 136.
Keys and Clough, 141.
Fowler, 143.
Bury, 144.
Wilson, 146.
Jefferies, 156.
Duclos, 157.
Hunt, 164.
Cookson, 167.
Blair and Watson, 170.
Gregson, 177.
Hills, F. and G., 183.
Duclos de Boussois, 183.
Sautter, 196.
Kneller, 196.
Rodger, 197.
Walters, 197.
Newton, 199.
Duclos de Boussois, 200.
Graham, 201.
Stagg, 202.
Cookson, 207.
Turner, 210.
Birkmyre, 212.
Gamble, 214.
Barratt, 215.
Napier, 221.
Bankart, 227.
Bell, 231.
Jones, 232.

Sulphuric acid, making or obtaining—*cont.*
  - Kurtz, 235.
  - Bell, 239.
  - Hills, 240.
  - Jullion, 243.
  - Tilghman, 248.
  - De Sussex, 249.
  - De Sussex, 252.
  - Prelier, 254.
  - Birkmyre, 258.
  - Laming, 266.
  - McDougal and Rawson, 269.
  - Wilson, 277.
  - Ecarnot, 282.
  - Todd, 284.
  - Fontainemoreau, 292.
  - Swindells, 299.
  - Gossage, 301.
  - Bell, 303.
  - Taylor, 303.
  - Normandy and Fell, 308.
  - Watt, 309.
  - Lowe and Evans, 312.
  - Boulton, 317.
  - Graham, 318.
  - Bell, 319.
  - Bell, 322.
  - Roberts, 323.
  - Laming, 325.
  - Petrie, 328.
  - Swindells and Nicholson, 334.
  - Petrie, 338.
  - Wall, 338.
  - Watson and Slater, 339.
  - Cowen and Richardson, 344.
  - Gautier, 347.
  - Taylor and Philips, 349.
  - Barlow, 350.
  - Smith, 353.
  - Henderson, 354.
  - Werckshagen, 358.
  - Robb, 364.
  - Robb, 366.
  - Richardson, 373.
  - Henderson, 382.
  - Hunt, 385.
  - Bell, 388.
  - Leyland, 388.
  - Pattinson, 391.
  - Cuninghame, 393.
  - Deacon and Leland, 394.
  - Moinier, 404.
  - Thornthwaite, 404.
  - Cookson, 408.
  - Trueman, 410.
  - Hübner, 411.
  - Trueman, 416.
  - Plisson, 417.
  - Hunt, 424.
  - Blythe and Kopp, 429.
  - Shanks (*Von Seckendorf*), 429.
  - Evans and McBryde, 433.
  - Von Seckendorf, 433.
  - Margueritte, 434.

Sulphuric acid, making or obtaining—*cont.*
  - Schmersahl and Bouck, 439.
  - Blythe and Kopp, 442.
  - Cuninghame, 446.
  - Clapham, 447.
  - Johnson (*Persoz*), 450.
  - Holland, 452.
  - Favre, 454.
  - Bellford (*Kuhlmann*), 456.
  - Tilghman, 458.
  - Margueritte, 471.
  - Barrow, 473.
  - Laming, 475.
  - Barrow, 477.
  - Gossage, 484.
  - Firmin, 486.
  - Johnson (*Tassy de Montluc and Gautier*), 494.
  - Crockett, 497.
  - Petrie, 499.
  - Baggs, 502.
  - Clark, 507.
  - Gossage, 513.
  - Gossage, 519.
  - Gossage, 521.
  - Gossage, 523.
  - Oliver, 530.
  - Newton, 537.
  - Hills, 539.
  - Proctor, 540.
  - Gatty, 545.
  - Spence, 546.
  - Gossage, 550.
  - Hills, 556.
  - Hills, 561.
  - Bouck, 562.
  - Blair, 564.
  - Boulton, 567.
  - Greenshields, 572.
  - Allen, J. and W., 575.
  - Imeary and Richardson, 576.
  - Crockford, 580.
  - Bethell, 592.
  - Roberts and Dale, 594.
  - Crockford, 605.
  - Spence, 607.
  - Johnson (*Persoz*), 628.
  - Arrott, 629.
  - Simon, 635.
  - Richardson, 639.
  - Spencer, 642.
  - Gossage, 646.
  - Henderson, 651.
  - Hunter, 656.
  - Willans, 658.
  - Hunt, 669.
  - Longmaid, 671.
  - Arrott, 681.
  - Wilson, 682.
  - Townsend and Walker, 687.
  - Petrie, 692.
  - Hunt, 705.
  - Newton (*Le Chatelier*), 706.
  - Townsend and Walker, 714.
  - Mease, 719.

Sulphuric acid, making or obtaining—*cont.*
- Drevet, 722.
- Ward, 733.
- Laing and Swindells, 733.
- Roman, 739.
- Spence, 741.
- Noble, 742.
- Laing and Cousins, 748.
- Martin, 750.
- McClintock, 758.
- Brooman (*Aubertin*), 760.
- Spence, 764.
- Monckton, 771.
- Glass, 777.
- Johnson (*Burton*), 783.
- Petrie, 786.
- Croll, 791.
- Dickson, 793.
- Dickson, 798.
- Verstraet and Olivier, 802.
- Coffey and Redwood, 805.
- Pudney, 809.
- Glass, 812.
- Clark (*Verstraet and Schmid*), 831.
- Spence, 835.
- Brooman (*Burnet*), 835.
- Baggs and Simpson, 838.
- Clemm, 845.
- Mond, 853.
- Gerstenhöfer, 855.
- Bowron and Robinson, 859.
- Dixon, 860.
- Bowron and Robinson, 865.
- Davies (*Smith and Savage*), 876.
- Newton (*De Massy, L. P. R. and L. R.*), 878.
- Hills, 881.
- Napier, 890.
- Pughsley, 894.
- Forbes, 894.
- Baggs and Simpson, 902.
- Reynolds, 907.
- Binks, 910.
- Richardson and Rücker, 931.
- Lockey, 942.
- Bell, T. and T. L. G., 947.
- Bankart, 953.
- Bell, 959.
- Todd, 967.
- Weldon, 971.
- Muspratt, 977.
- Davies (*Rémond*), 979.
- Lunge, 981.
- Weldon, 987.
- Whelpley and Storer, 990.
- Davies (*Rémond*), 997.
- Newton (*Baker, Poole, and Stacc*), 998.
- Bousfield (*Hofmann*), 1005.
- Weldon, 1007.
- Seitz, 1011.
- Baggs, 1018.

Sulphuric acid, chambers for:
- Leyland, 258.
- Deacon and Leyland, 394.
- Johnson (*Persoz*), 456.
- Gossage, 484.
- Gossage, 513.
- Gossage, 519.
- Gossage, 521.
- Oliver, 590.
- Simon, 635.
- Petrie, 683.
- Ward, 733.
- Pudney, 809.
- Clark (*Verstraet and Schmid*), 831.

Sulphuric acid nordhausen:
- Prelier, 354.

Sulphuric acid, residues from, use of:
- Barratt, 215.
- Bouck, 562.
- Leisler (*Hasenclever*), 605.
- Gossage, 610.
- Richardson, 788.
- Claudet, 1009.

Sulphurous acid, making or obtaining:
- Young, 107.
- Maugham, 114.
- Croll, 139.
- Bincks, 149.
- Duclos de Boussois, 157.
- Poole, 161.
- Farmer, 168.
- Blair and Watson, 170.
- Gregson, 177.
- Le Jeune, 187.
- Duclos de Boussois, 189.
- Walters, 197.
- Duclos de Boussois, 200.
- Stagg, 202.
- Newton, 203.
- Lee, 208.
- Turner, 210.
- Radley, 220.
- Longmaid, 226.
- Bankhart, 227.
- Gossage, 232.
- Bell, 239.
- Croll, 265.
- Ecarnot, 282.
- Todd, 284.
- Lowe and Evans, 312.
- Bell, 322.
- Laming, 325.
- Ward, 333.
- Michiels, 350.
- Henderson, 354.
- Robb, 364.
- Robb, 366.
- Böhringer and Clemm, 370.
- Henderson, 382.

Sulphurous acid, making or obtaining—*cont.*
- Hunt, 385.
- Bell, 388.
- Trueman, 410.
- Hähner, 411.
- Trueman, 416.
- Spence, 426.
- Blythe and Kopp, 429.
- Von Seckendorf, 433.
- Schmersahl and Bouck, 439.
- Blythe and Kopp, 442.
- Cunningham, 446.
- Johnson (*Persoz*), 450.
- Holland, 452.
- Favre, 454.
- Paris, 457.
- Tilghman, 458.
- Barrow, 473.
- Barrow, 477.
- Pontifex, 480.
- Gossage, 484.
- Radley, 493.
- Gossage, 499.
- Baggs, 502.
- Clark, 507.
- Gossage, 519.
- Gossage, 521.
- Gossage, 526.
- Brooman (*Mesdach*), 528.
- Oliver, 530.
- Newman, 537.
- Gossage, 546.
- Gossage, 550.
- Townsend, 553.
- Imeary and Richardson, 576.
- Crockford, 580.
- Gossage, 595.
- Crockford, 605.
- Spence, 607.
- Spencer, 617.
- Johnson (*Persoz*), 628.
- Medlock, 637.
- Spencer, 642.
- Henderson, 651.
- Hunter, 656.
- Willans, 658.
- Richardson and Prentice, 662.
- Hunt, 669.
- Longmaid, 671.
- Wilson, 682.
- Gélis, 690.
- Hunt, 705.
- Newton (*Le Chatelier*), 706.
- Losh, 712.
- Mease, 719.
- Hallett and Stenhouse, 720.
- Hallett and Stenhouse, 722.
- Drevet, 722.
- Jullion, 724.
- Jones, 725.
- Laing and Swindells, 733.
- Spence, 741.
- Noble, 743.
- McClintock, 758.
- Spence, 764.
- Cleland, 768.
- Todd, 774.
- Brooman (*Delaune*), 776.
- Glass, 777.
- Johnson (*Burton*), 783.
- Dickson, 798.
- Verstraet and Olivier, 802.
- Schnell (*Mond*), 803.
- Glass, 812.
- Bath, 816.
- Clark (*Verstraet and Schmid*), 831.
- Brooman (*Burnet*), 835.
- Clapham, 839.
- Clemm, 845.
- Gerland, 849.
- Mond, 853.
- Gerstenhöfer, 855.
- Bowron and Robinson, 859.
- Bowron and Robinson, 865.
- Forbes, 894.
- Price, 924.
- Richardson and Rücker, 931.
- Chaudet, 939.
- Lockey, 942.
- Bell, T. and T. L. G., 947.
- Reece, 949.
- Bankart, 953.
- Robinson, 956.
- De Sinçay, 956.
- Todd, 967.
- Weldon, 971.
- Davies (*Rémond*), 970.
- Oldham, Penn, and Eades, 981.
- Lunge, 981.
- Rowland, 986.
- Whelpley and Storer, 990.
- Davies (*Rémond*), 997.
- Weldon, 997.
- Robinson, 1003.
- Bousfield (*Hofmann*), 1005.
- Claudet, 1009.
- Seitz, 1011.

Tan, spent, use of:
- Heys, 32.
- Fishwick, 35.
- Grace, 57.
- Hodson, 60.
- Ham, 97.
- Solomons and Azulay 263.
- Muclow, 352.
- Horton, 448.
- Hills, 556.
- Greenshields, 569.
- Lichtenstadt and Duff 586.
- Lorberg, 658.
- Webster, 691.
- Lorberg, 728.
- Balmain, 764.
- Hartley (*Huwitz*), 822.
- Lorberg, 852.
- Hills, 881.
- Player, 973.

Tannic acid and tannates, making or obtaining
De Suarce and Pontifex, 152.
Cronier, 160.
Turnbull, 213.
Stones, 285.
Johnson (*Rich*), 434.
De Bussac, 460.
Jennings, 560.
Henry (*Obert, Vasseur, and Houbigant*), 679.

Tannin. *See* Tannic acid.

Tartar, substitute for:
Bancroft, 532.
Bonney, 532.

Tartaric acid and tartrates, making and obtaining:
Savory, 85.
Reade, 244.
Crane and Jullion, 260.
Gatty, 293.
Firmin, 307.
Price, 330.
Bellford, 395.
Poole, 399.
Pontifex, 480.
Firmin, 486.
Needham and Kite, 489.
Pontifex and Ogston, 503.
Clark, 507.
Firmin, 648.
Firmin, 813.
Row, 917.

Tartaric acid, substitute for:
Barcroft, 532.
Bonney, 535.

Tartaric acid, waste liquor from, using:
Firmin, 813.

Tin chlorides:
Duclos de Boussois, 200.
Young, 270.
Emerson, 362.
Higgin, 413.
Price, 422.
Dale, 465.
Claus, 520.
Bonney, 535.
Henderson, 651.
Marçais, 989.

Tin chromate. *See* Chromic acid.

Tin fluosilicates. See Fluorine.

Tin muriates. *See* Tin chlorides.

Tin nitrates:
Emerson, 362.

Tin oxides, making or obtaining:
Richardson, 265.
Young, 270.
Richardson, 319.
Roberts, 330.
Staite, 362.
Dering, 364.
Henderson, 382.
Higgin, 413.
Price, 422.
Henderson, 430.
Dale, 465.
Hähner, 480.
Henderson, 548.
Longmaid, 671.
Smith, 742.
Cobley, 745.
Brooman (*Burnet*), 835.
Marçais, 989.

Tin oxymuriate. *See* Tin, chlorides of.

Tin sulphates:
Duclos de Boussois, 200.
Birkmyre, 256.
Emerson, 362.
Dale, 465.
Smith, 742.

Tin sulphides or sulphurets, making or obtaining:
Higgins, 29.
Price, 422.
Claus, 520.
Smith, 742.
Cobley, 746.
Brooman (*Burnet*), 835.

Tungstic acid and tungstates, making or obtaining:
Emerson, 362.
Spilsbury and Emerson, 463.
Spilsbury, 485.
Spilsbury, 492.
Oxland, 556.
Spilsbury, 580.
Emerson, 624.
Ellis, 945.

Ulmates:
Possoz, 598.

Ulmic acid:
Stones, 285.

Uranium and compounds:
Gerland, 788.

Urea:
Turner, 234.

Uric acid:
Turner, 234.

Ultramarine blue:
Luis, 592.

Vanadium and its compounds:
Newton (*Le Chatelier*), 619.

Vat residuum or waste. *See* Calcium sulphuret.

Verdigris. *See* Copper acetates.

Verditer. *See* Copper carbonates.

Vinegar. *See* Acetic acid.

Vitriol. *See* Sulphuric acid.

Vitriol blue. *See* Copper sulphate.

Vitriol green. *See* Iron protosulphate.

Vitriol white. *See* Zinc sulphate.

White lead. *See* Lead carbonate.

Xanthamylic acid and its compounds:
Stenhouse, 680.

Xanthic acid and its compounds:
Stenhouse, 680.

Xanthomethylic acid and its compounds:
Stenhouse, 689.

Yellow lead. *See* Lead oxides.

Zinc acetate, making or obtaining:
Browne, 55.
Glass, 469.
Tolhausen (*Rousse*), 751.

Zinc bi-sulphuret. *See* Zinc hyposulphite and sulphite.

Zinc carbonate:
Laming, 256.
Barlow, 281.
Dering, 364.
Henderson, 430.
Ransome, 432.
Fontainemoreau, 437.
Gossage, 461.
Stott, 472.
Gossage, 506.
Clark (*Margueritte and De Sourdeval*), 735.
Brooman (*Delaune*), 776.
Baggs and Simpson, 838.
Stille, 844.
Webster, 858.
Robertson, 970.
Crockford, 1013.

Zinc chloride, making or obtaining:
Barratt, 149.
Hunt, 156.
Croll, 159.
Hunt, 164.
Swindells, 299.
Watt, 309.
Boulton, 317.
Taylor and Phillips, 349.
Hunt, 424.
Henderson, 430.
Hunt, 444.
Crockford, 586.
Webster, 601.
Henderson, 614.
Henderson, 651.
Tolhausen (*Rousse*), 751.
Morris, Weare, and Monckton, 753.
Stille, 844.
Crockford, 849.
Webster, 858.
Oldham, Penn, and Eades, 981.

Zinc chromate. *See* Chromic acid.

Zinc cyanide:
Barlow, 281.

Zinc ferrocyanide:
Watson and Slater, 339.

Zinc fluosilicate. *See* Flu[illegible]e.

Zinc hyposulphite an[illegible]lphite:
Johnson, 336.
Noel (*Geslin*), 391.

Zinc nitrate :
Watt, 309.
Tolhausen (*Rousse*), 751.
Stille, 844.

Zinc oxides, making or obtaining :
Murdock, 37.
Atkinson, 47.
Barratt, 149.
Hunt, 164.
Croll, 172.
Dyer, 182.
Duclos de Boussois, 200.
Longmaid, 206.
Longmaid, 226.
Laming, 256.
Rochaz, 259.
Rochaz, 274.
Barlow, 281.
Todd, 284.
Protheroe, 290.
De Douhet, 291.
Newton, 295.
Scott, 296.
Swindells, 299.
Boulton, 317.
Graham, 318.
Bekaert, 327.
Roberts, 330.
Taylor and Phillips, 349.
Bellford, 357.
Cowper, 361.
Dering, 364.
Geyelin, 370.
Henderson, 382.
Noel (*Geslin*), 391.
Kuczynski, 418.
Hunt, 424.
Henderson, 430.
Ransome, 432.
Fontainemoreau, 437.
Blythe and Kopp, 442.
Hunt, 444.
Johnson (*Persoz*), 450.
Stott, 472.
Darlington, 474.
Gedge (*Rostaing*), 477.
Hähner, 480.
Titterton, 485.
Titterton, 487.
Stott, 492.
Fontainemoreau (*Selmi*), 502.
Titterton, 506.
Gossage, 526.
Oliver, 530.
Price, 571.
Price, 577.
Deacon, 581.
Henderson, 614.
Graham, 644.
Henderson, 651.
Hallett and Stenhouse, 722.
Cobley, 726.
Kernot and Rucker, 731.

Zinc oxides, making or obtaining—*cont.*
Smith, 742.
Cobley, 745.
Kernot and Rucker, 756.
Webster, 758.
Johnson (*Muller*), 762.
Darlington, 817.
Newton (*Lewis*), 821.
Humby, 830.
Felsch, 830.
Bousfield (*Elmer*), 832.
Brooman (*Burnet*), 835.
Bennett, 841.
Crockford, 849.
Webster, 858.
Henry (*Pallu*), 861.
Holdrege (*Gwynne*), 864.
Darlington, 873.
Millan Del Real, 882.
Graham, 920.
Dufrené (*Tellier*), 938.
Spence, 848.
Oldham, Penn, and Eades, 981.
Crockford, 1013.
Brooman (*Cordurié*), 1019.

Zinc phosphates :
Margueritte, 435.
Paul, 529.

Zinc silicates :
Ransome, 432.
Cobley, 745.

Zinc sulphates, making or obtaining :
Sanderson, 26.
Croll, 159.
Hunt, 164.
Rowlandson, 273.
Todd, 284.
Watt, 309.
Binks, 376.
Noel (*Geslin*), 391.
Condy, 401.
Henderson, 430.
Fontainemoreau, 437.
Glass, 469.
Price, 571.
Crockford, 580.
Webster, 601.
Crockford, 605.
Henderson, 651.
Smith, 742.
Tolhausen (*Rousse*), 751.
Crockford, 849.
Oldham, Penn, and Eades, 981.
Weldon, 997.
Darbel, 1007.
Crockford, 1013.

Zinc sulphides or sulphurets, making or obtaining:
Croll, 159.
Croll, 172.
De Douhet, 291.
Clark, 359.
Dering, 364.
Kuczynski, 418.
Blythe and Kopp, 442.
Stott, 472.
Stott, 492.
Gossage, 506.
Gossage, 526.
Maltby, 538.
Deacon, 581.
West, 699.
Townsend and Walker, 714.
Smith, 742.
Cobley, 748.
Brooman (*Delaune*), 776.
Brooman (*Burnet*), 835.
Claudet, 1009.
Crockford, 1013.

Zinc tungstates. *See* Tungstic acid.

Zincates:
Paul, 529.

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